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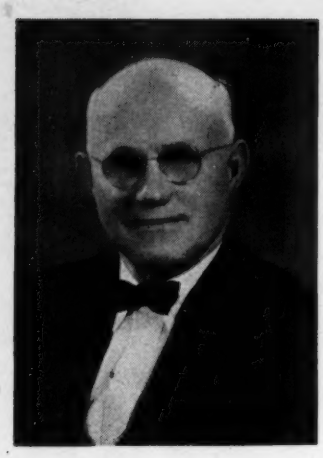
American Foundryman

A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES

November 1943



California Chapters Look to A.F.A. Principles to Solve War and Post-War Problems

THE two West-coast Chapters of the A.F.A. are far removed geographically from the great body of foundries of the Mid-West and East, comprising the majority membership of A.F.A. In spirit, however, we are not separated.

Years ago, as our population grew, we of the Far West were forced to build our mutual welfare organizations in a hurry . . . far faster than it took the East to develop to the point of national organization. We found a National group ready for us when we had our own groups built and thereafter our strides were rapid, for we no longer worked alone.

We appreciate the aids given us by A.F.A. and its incentive power. The past officers of the Northern and Southern California Chapters have worked hard and long to develop consciousness of membership in A.F.A. in foundries of the West Coast and to break down individual isolation by organizing division forums.

Today we are forced by a wartime condition to again step into hard planning . . . but this time under greater pressure. The normal labor population on the West Coast has been stepped up at least 400 per cent. A great population, which has emigrated to us, has made the West Coast the heavy factor that it is in airplane, ship and ordnance manufacture.

The great number of new foundries play a leading part in this war-goods production. The majority of the new workers (a group estimated to be close to a million people) will remain after the war, because they either cannot or prefer not to return to their old homes. Employment must be found for them.

The present Chairmen of California chapters—H. A. Bossi of Northern, and Walter F. Haggman of Southern—are in there swinging with both fists, as were their predecessors. They are not only working intensely for necessary new members, but are developing with their post-war planning committees the best way possible to handle the post-war employment problem.

Here again the principles of A.F.A., applied with the well-known Western direct-action factor, will do the job. We realize that this is a MUST problem, for in solving the "Salvage of Worker" angle, we also will work out the "Right of Survival of the Small Business"—the foundation stone of Democracy.

We will need the best of friendly gifts from the Eastern groups . . . experience and moral co-partnership. Neither East nor West will do as well as they might on this, their similar problem, if they work alone.

Such is our feeling toward our A.F.A. membership, and such will be our remembered guide in our business efforts.

J. G. COFFMAN, *Director*
American Foundrymen's Association.

J. G. COFFMAN, Plant Manager of Los Angeles Steel Casting Co., Los Angeles, began his career in the East, but has long been identified with the foundry industry on the Pacific Coast. An active member of the Southern California Chapter, he was the Chapter's second Chairman. Born in Pennsylvania, he was connected with Franklin Steel Co. and National Malleable & Steel Castings Co. before moving West in 1911. Thereafter he served with Nevada Engineering Co., Pacific Coast Steel Co., Noble Electric Steel Co., Lash Steel Co. and Southern California Iron & Steel Co., before joining his present company in 1923. For years he has been an active member of A.F.A., and was elected Director in 1941.

American Foundryman

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Entered as second class matter July 22, 1938, at the post office at Chicago, Illinois, under the Act of March 3,1879.

This article outlines the steps taken in producing high-temperature, good quality steel necessary for pouring into green sand molds for castings containing thin sections. Particular emphasis is placed on proper slag control to secure best results. The paper was presented first at the Electric Furnace Conference, sponsored by the American Institute of Mining and Metallurgical Engineers, at Pittsburgh, Pa., October 1-2, 1943.

Outline Methods of Obtaining High Temperature Steel for Thin Sections

By H. H. Blosjo
Minneapolis Electric Casting Co., Minneapolis

IN A FOUNDRY where a large portion of the production is of very light section, and where such molds are located a considerable distance from the bull ladle, the temperature of the metal leaving the furnace must be high and the quality good to insure castings relatively free from missruns and of satisfactory physical properties.

In the foundry with which the writer is connected, it is necessary to transfer from the furnace to a teapot ladle, then to hand shanks and, in many cases, to carry these shanks for a distance of 80 ft. before pouring some castings of light section.

Actual temperatures are not discussed in this article, since no attempt is made at this plant to determine the temperature of the metal, or to take a temperature count. The proper temperature of the metal is arrived at by continual observation of slag fractures and observation of the boil. Sometimes it is necessary to check the carbon of the melt rather early in the heat, if the slag color varies from that which is expected, or if the carbon boil should fail to start at the proper time.

Furnace Practice

To make the above statements a little clearer, let us follow a 4,000 lb. heat in a 1½-ton, acid-lined, electric melting furnace, from the melt down to the mold. During the melt down, and as soon as a bath has formed underneath the electrodes, 30 to 40 lb. of slag from a previous heat are added to get quick coverage of the bath and also to increase the MnO content of the slag.

When the charge is first completely molten, the slag fracture should be black and contain from 30 to 35 per cent FeO. If the charge does not contain enough oxide to give a black slag at this time, the oxide content is increased by adding slag from the oxy-acetylene torches. (It is surprising how much good metal is recovered from trimmings of gates and risers left in this cutters slag.)

Slag Reactions

The metal analysis shortly after the melt down, and when covered with the above-mentioned black slag, will be from 0.30 to 0.36 per cent carbon, 0.15 to 0.20 per cent manganese, and 0.06 to 0.10 per cent silicon. The silicon at this time is practically as low as it becomes. The manganese drops until the carbon boil is quite pronounced and hits a low of from 0.10 to 0.15 per cent. The carbon content begins to fall as the temperature rises, with a resulting decrease in FeO in the slag. The color of the slag fracture changes progressively from black to blackish grey, to greenish grey, to a greenish yellow when the heat is ready to tap. The carbon in the melt drops to a low of 0.10 to 0.15 per cent as the boil subsides, and the FeO in the slag drops to from 14 to 17 per cent. The sum of the FeO and MnO in the slag at this time varies from 32 to 35 per cent. Generally speaking, the FeO content is on the low side when the MnO content is on the high side and vice versa. These slags have no added lime.

Silicon Reduction

The reaction between the SiO_2 and carbon to form silicon is dependent on the temperature; however, with our melting procedure, the silicon hits a low point when the FeO in the slag is about 25 per cent and the MnO is about 18 per cent. The MnO content is fairly constant throughout the heat. Therefore, the silicon is controlled by the ratio of FeO to SiO_2 and also by the temperature.

Actual reduction of silicon from the slag starts when the FeO content is around 22 per cent. The rate is then very slow and is taking place at the same time as the FeO-carbon reaction reaches its peak. The color of the slag fracture is then changing from blackish grey toward greenish grey.

As the heat progresses, the temperature rises, the FeO-carbon reaction is slowing up and SiO_2-carbon reaction is increasing. When the FeO in the slag drops to 14 to 17 per cent, the FeO-carbon reaction practically subsides; however, the SiO_2-carbon reaction becomes more active and has a reduction rate of about 0.01 per cent silicon per minute. The color of the slag fracture turns greenish grey as the FeO approaches 20 per cent and finally turns greenish yellow between 14 and 17 per cent FeO.

The total silicon reduction obtained in normal times was enough to finish the heat between 0.30 to 0.40 per cent sili-

con without any silicon addition, except a little added in the pig iron used to adjust the carbon. At the present time, the furnace is being pushed to the limit, cutting down the time by increased power input and, although the melting procedure followed is still the same, the time required to refine is considerably less. The silicon reduced, therefore, is not as great, and our heats tend to finish with silicons in the range of 0.22 to 0.30 per cent, if no silicon is added. An addition of 0.12 per cent silicon is made to the teapot ladle when tapping from the furnace.

The manganese in the melt comes to a low point of 0.10 to 0.15 per cent about the time the silicon reduction starts. It, too, then is reduced from the slag as the FeO drops, the reaction being between the MnO and carbon. This reaction is milder than the SiO_2-carbon reaction, and the manganese reduced only amounts to about 0.06 to 0.10 per cent. The manganese addition is made in the teapot ladle.

Manganese Additions

Fifteen pounds of 80 per cent ferromanganese are used per ton of melt. The ferromanganese is preheated in the teapot ladle while preheating the ladle. This preheating of the manganese helps prevent chilling of the metal when adding the manganese in the ladle. With the melting practice used and by adding the ferromanganese in the ladle, very high manganese recoveries are obtained. An average manganese of 0.75 per cent is obtained with the above addition. Based on average residual manganese of 0.20 per cent at the time of tap, this gives a manganese recovery of 90 per cent.

It is, of course, desirable to have a high manganese recovery, particularly today when conservation of manganese is a necessity. Further than that, however, with the high temperature attained, together with the low FeO content of the slag, very rapid silicon reduction takes place if the ferromanganese is added to the furnace and the power input continued.

It might be argued, at this point, that as long as ferrosilicon has to be added to obtain the required silicon, it would be desirable to add the ferromanganese to the furnace and reduce the required silicon from the slag. This could be done and has been done without injury to the properties of the steel, but the silicon reduction rate is so rapid that proper control of the silicon content was not attained. Then, too, the control of the manganese was not as good and manganese recovery was much reduced.

When the slag fracture shows a greenish yellow color and the carbon boil has practically subsided, a quick magnetic permeability test for carbon is made, and pig iron is added to raise carbon to the desired analysis. About 2 min. after pig iron addition, the heat is tapped. The time from taking the test sample for carbon analysis out of the furnace to tapping is 6 to 7 min.

The teapot ladle into which the metal is tapped is thoroughly dried and preheated to a bright red. The hand shanks used also are dried thoroughly and preheated to a bright red.

While thus far it might seem that the title of this paper has been overlooked, the remarks that follow may become clearer if the background of the melting department procedure is borne in mind. It is, of course, realized that this melting procedure differs quite widely from that used in most acid electric foundries, and that, in all probability, it differs in some respects from the procedure used in any acid electric foundry. The fact still remains that the requirements of high temperature metal are the same no matter what melting practice is used. The precautions, on the other hand, will vary in some respects with the melting practice.

Requirements

The requirements for obtaining high-temperature metal are:

1. The metal delivered by the furnace must have good physical qualities.

2. The metal delivered by the furnace must be subjected to a minimum of contamination between the furnace and the mold.

3. The metal delivered by the furnace must be hot and fluid.

4. The metal must maintain its fluidity for a considerable time after tapping.

To obtain metal of good physical properties in the castings, it is necessary to have metal of exceptionally good qualities delivered by the furnace, as a certain amount of contamination between the furnace and the mold is sure to take place. Furthermore, most of the castings requiring hot metal are poured into green sand molds, the moisture of which tends to further decrease the quality of the metal.

Precautions

To insure good quality of the metal at the mold, capable of running light sections, the following precautions are among the most important:

1. To melt down with an average carbon content of 0.30 to 0.36 per cent. This will give sufficient boil in dropping to 0.10 to 0.15 per cent later in the heat, to flush out hydrogen and other gases which tend to destroy the quality of the metal.

2. The slag at melt down should contain 30 to 35 per cent iron oxide, calculated as FeO, and if not an addition should be made immediately. This is important as the reaction $2\ FeO + Si \longleftrightarrow SiO_2 + 2\ Fe$ tends to go to the right more rapidly at low temperatures than at higher temperatures.

It is desirable to get the silicon low early in the heat, because silicon has an affinity for gases. With high FeO in the slag early in the heat, the silicon content in the metal will be low during the major part of the carbon boil. A good carbon boil, together with a low silicon in the melt, favors the removal of gases picked up from rusty and dirty scrap.

Once these gases have been removed, the silicon content may again be allowed to go up, provided the bath is not again contaminated by adding wet or dirty materials. Furthermore, when the silicon is kept low during the major part of the boil, the condition usually spoken of as

"over reduced," but which is better expressed by the term "under-oxidized," will not result.

This condition does not result from silicon reduction, but results from dead melting, where the silicon content throughout the heat is quite high and only a weak boil is attained, the cause being too low FeO in the slag early in the heat. Under-oxidized metal has poor physical qualities, a tendency toward wildness in the mold, and very poor fluidity, even though the temperature may be high.

3. There should be a balance between the FeO content of the slag and the carbon content of the metal as the heat proceeds. It is impossible to put this in writing so that a clear picture of this procedure may be obtained. First, the slag colors mentioned in this paper are only relative colors and might be described very differently by another observer. Furthermore, to maintain the proper slag color, an operator must work with it for some time.

Usually the operator can tell fairly early during the boil whether the FeO in the slag and carbon in the melt are coming down together to the desired analysis. If there is any question, a rapid carbon determination is made and then necessary pig iron or iron oxide is added.

4. As soon as the FeO-carbon reaction subsides, test for carbon content should be made, proper carbon addition made, and the heat tapped. This time of heat can be ascertained by watching the boil. A few bubbles will be observed coming through the slag. These bubbles are, in all probability, due to the reduction of silicon by carbon. The temperature of the heat at this time is high and, if the operator does not take immediate steps to finish the heat, the slag will, in a short time, become quite viscous, further heat input will be difficult and the silicon content erratic and on the high side. A point can well be mentioned here and that is, with low FeO contents late in the heat, high temperatures can be obtained without increasing slag volume too much. This also means less attack of the hearth at the slag line.

5. A precaution which should not be overlooked is the condition of the ladles into which the metal is tapped. They should be thoroughly dry, well preheated and as clean of slag from previous heats as possible. Skulls from previous heats must be removed entirely.

6. To insure sound castings with good physical properties, an aluminum addition of 2 to 2½ lb. per ton of melt seems desirable. It must be remembered that this metal must be transferred twice and then poured into green sand molds, and that the castings should still retain some aluminum in the metallic form to produce the proper type of sulfide inclusions.

Portable Unit Makes Castings for Army

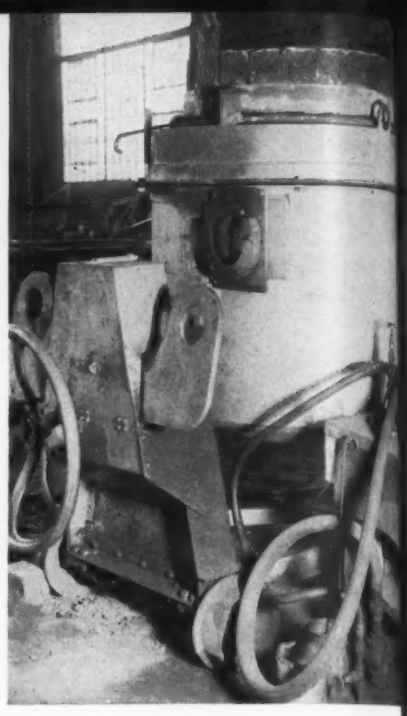
A PORTABLE 1000-lb. capacity melting furnace is being used at the General Electric Company's Schenectady Works in melting aluminum for castings to be used by the army.

H. J. Hunt, a foreman in the company's foundry shop, developed the portable unit which is a conversion of a stationary oil-fired furnace. It is trunnion-mounted, with two-eyed plates welded on both of the frame uprights for lifting the entire assembly by a 4-hook crane sling.

The furnace is fired by a removable burner, attached to the sidewall by sliding it into a semi-circular flange and locking it down with a wing nut. The burner fixture fits against the furnace wall at a tangent so that the flame is spiralled downward. Oil is fed through a flexible metal hose, and air through a rubber hose.

The portable furnace obviates the need for superheating the aluminum charge, thus avoiding possible excessive oxidation. By permitting the metal to be poured directly from furnace to mold, the unit also eliminates the problems of preheating transfer ladles and crucibles.

As the casting for which the furnace is used is about ½-in. thick, the best pouring temperature is said to be about 1202 to 1310°F. The furnace, lined with fire brick, has needed only two relinings in handling more than 2500 charges. Loaded with its charge, the unit weighs about 3 tons.



Side view of 1000-lb.-capacity oil-fired melting furnace for melting and pouring aluminum castings.

A.F.A. Group Reviews Code Recommendations

THE A.F.A. Foundry Cost Committee recently appointed a subcommittee to review the recommendations of the Committee on Foundry Codes, first developed in 1932 for the purpose of issuing a set of recommendations to buyers of castings, listing the information foundries should obtain from prospective purchasers of castings. These recommendations have been widely distributed in pamphlet form and also have been published in the A.F.A. *Cast Metals Handbook.*

The reviewing committee is composed of:

Chairman, C. A. Davis, Caterpillar Tractor Co., Peoria, Ill.

John L. Carter, Gray Iron Founders Society, Cleveland.

E. W. Horlebein, Gibson & Kirk Co., Baltimore, Md. (Representing Non-Ferrous Founders' Society).

C. S. Roberts, Dodge Steel Co., Philadelphia, Pa. (Representing Steel Founders' Society).

J. A. Wagner, Wagner Malleable Iron Co., Decatur, Ill. (Representing Malleable Founders' Society).

This committee carefully checked the 1932 Code and, in

view of more recently developed practices, submitted an extensively revised schedule to the Cost Committee. It is expected that the revisions will be approved, at which time they will appear in the *American Foundryman.*

It is of interest to note that representatives from the several foundry trade associations have taken part on this A.F.A. Cost Committee, which has cooperated with the different trade groups for some years, urging all foundrymen to "know their costs" and to follow accepted cost systems.

Recently the A.F.A. committee analyzed the cost factors of the various branches and published a summary of their findings, which has been issued as A.F.A. Preprint 41-25, entitled "Classification of Foundry Cost Methods."

Industry Loses a Noted Leader Donald Campbell of C.W.C.

DONALD J. CAMPBELL, President of Campbell, Wyant & Campbell Foundry Co., Muskegon, Mich., since the firm was incorporated in 1908, died October 11 at his home in Muskegon after an illness of many months. An A.F.A. Medalist, Mr. Campbell was awarded the Wm. H. McFadden Gold Medal of the Association in 1939 in recognition of the developments achieved by his company in the casting manufacturing processes.

Don Campbell, born in Canada in 1877, marked the third generation of craftsmen devoted by family tradition to iron founding, and the achievements of his firm are a tribute to how well he carried on that tradition. At the age of 11 he became a foundry apprentice and came up through the ranks of journeymen to the position of chief executive of one of the largest and most progressive foundry organizations in the world.

Since the firm was originally formed by Mr. Campbell, Ira A. Wyant and George W. Cannon, all practical molders from Chicago, the staff of employees of C.W.C. has grown from three (the partners themselves) to over 2500. Throughout their association they have maintained a broad vision of new methods and new ideas, not only as to production processes but also in the development of efficient personnel.

As the head of development and special processes, Mr. Campbell's leadership brought about many advancements in the foundry art, as shown by over 150 patents covering both equipment and processes, largely in the automotive field. Notable

Donald J. Campbell

among these were the substitution of green sand cores for dry sand in cylinder block casting; individually cast piston rings, camshafts and crankshafts, centrifugal casting of cylinder liners, the triplex method of alloyed metal production, and many designs in high-speed and labor-saving molding machines and associated equipment for foundry production.

Mr. Campbell was voted an Honorary Membership of A.F.A. in 1939, and Campbell, Wyant & Cannon have maintained a company membership in the Association since 1914. For many years, men of the company have played an active part in A.F.A. work, presenting papers at technical meetings and servings on a number of committees.

War Indicates Value Of Apprenticeship

THE value and growing recognition of apprenticeship, brought into full light by war production problems, is indicated in the recent release of two booklets—"Training Apprentices for War and Post-War Work" and "Machinist Apprenticeship Standards" — issued by the War Manpower Commission, of which W. F. Patterson is chief.

There is a growing trend to provide apprenticeship opportunities for returning servicemen, boys in the 16-17 age group, and those not qualified for combat service, for industry generally has suddenly awakened to the advantages offered by bringing "new blood" into industrial fields.

At the A.F.A. 2nd War Production Foundry Congress and 47th Annual Meeting, held at St. Louis, April 28-30, 1943, Mr. Patterson was one of the speakers at sessions dealing with apprentice training in the foundry industry.

Gray Iron Founders Elect New Officers

MEETING at the Netherland Plaza Hotel, Cincinnati, on October 5-6 for their 15th annual meeting, members of the Gray Iron Founders Society elected Walter L. Seelbach, Forest City Foundries Co., Cleveland, president for 1943-44. Other officers elected were: Vice-President, H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J.; Secretary, F. H. Rayfield, Potter & Rayfield, Inc., Atlanta, Ga., and Treasurer, George Walton, Madison Foundry Co., Cleveland. W. W. Rose was elected Executive Vice-President.

Registration at the meeting was larger than at any previous annual meeting of the society, and important current and postwar problems were discussed. Among the guest speakers were Brig. Gen. Wm. C. Rose of the War Manpower Commission; U. S. Senator Jas. E. Murray of Montana, and Dr. Leo Wolman, Columbia University, New York.

As the needs of our armed forces impose increasing demands upon the already critical labor markets, women are being called upon to fill the empty places in the production lines of our war plants. Women's place in industry, their capabilities and special requirements are discussed in this paper, which was presented at a session of the 2nd War Production Foundry Congress and 47th Annual Meeting of the American Foundrymen's Association held in April, 1943, at St. Louis.

Women's Place in the Foundry Industry

By Sara Southall

Supervisor of Employment, International Harvester Co., Chicago, and Consultant, War Manpower Commission

THE number of different types of jobs and the possible number of women in the different foundries is largely a question of type of foundry. Foundries, steel mills, and shipbuilding yards are probably the most difficult industrial plants which must be made ready for accelerating employment of women.

If a foundry is a jobbing shop, it will be difficult to introduce women into the plant; if the foundry is a mechanized production unit, it will not be nearly as big a problem. It is the training problem in the jobbing shop that makes the difference.

Wisconsin Survey

A report of a survey on the use of women in foundries, by Dr. Paul A. Brehn, supervisor, Industrial Hygiene Unit, Wisconsin State Board of Health, Madison, Wis., was published in the June issue of *American Foundryman*. The survey covered about 30 foundries in Wisconsin and a few in neighboring states. It showed the different types of jobs in which women are employed.

While the report does not cover a large number of women, it indicates that, if the foundries surveyed were using women in the jobs stated, other foundries should at least study the possibility of using women in their shops in an effort to relieve the labor shortage.

Of course, women have been employed in core rooms for a long time, in work which is not too heavy for them. The previously mentioned report covers the use of women in the molding, melting, pouring, cleaning, laboratory, pattern, shipping and sand handling departments as well as in miscellaneous jobs around the foundry.

The survey also brings out some of the safety hazards and health factors peculiar to the employment of women. It is an excellent report and one well worth reading.

One thing that is still noticeable in foundries is the old hazard about women's shoes. The use of safety shoes has been stressed constantly in industry, but frequently in foundries (and Dr. Brehn's report so indicates) women are working where there are serious hazards of falling articles, and they are permitted to wear open-toe shoes and even bedroom slippers. That is a very dangerous practice.

The Shoe Hazard

Foundries should make it a condition of employment that safety shoes of some kind must be worn by women workers, because foundries have much more of a hazard in relation to foot injuries than many other industries.

In the recruitment and training of women generally in industry, the War Manpower Commission, some months ago, issued a

Women coremakers at Lynchburg Foundry Co. make cores so large they must be handled with cranes. Left—The first women coremakers at the Radford, Va., plant. Right—Coremaking in the special foundry, Radford plant.

statement of policy asking all government agencies and all contractors to abide by the course outlined. It seems to be a policy that, if sound personnel practices prevailed, industry would be operating under the same principles anyway.

This policy urged that the first women recruited be single women, then married women without children, then married women with children over 14 years of age and, finally, married women with children under 14 years of age.

Some employers operating in tight labor markets know that, unless there is almost compulsion, there are not any more single women who really want to work. That does not mean that there are no more single women.

There are many single women who do not need to work and who might be induced to do so for patriotic reasons. However, the source of single women who really want to work has been tapped in most of the near critical labor market areas. In some areas, married women without children have been pretty well absorbed. The next problem is married women with children.

In a meeting in New York, an argument developed about the employment of married women with children over 14 years of age. It was asked why the War Manpower Commission used 14 years as the dividing line. The group argument was: "Look at all the delinquency among children over 14 years of age, turned loose without their mothers!"

The logical answer to this was: "Do you want to lock up the babies, tie them in their beds? Which is worse—try to bring up a youngster until he is 14 years old to have a little sense, or go and leave young children?"

There is no right age to take a woman who has children out of the home, but this is war! If all the other women are working, the best possible choice is the only choice to make. The policy is sound.

The Manpower Commission also sets the policy of "equal wages for equal work" in the employment of women, and that,

As in many a war production plant, Lynchburg Foundry Co. employs numerous women in machining operations, such as turret and small lathe work, in the Lynchburg, Va., plant.

instead of importing labor, local labor supply be used fully and that employers put aside prejudices based on race, color or creed.

The Child Care Problem

Child care is a community problem, but most companies operating in critical areas are immediately faced with the day nursery and extended school-hours program. If an employer has a plant located in an area where labor is inaccessible and he cannot get help, and there are no community organizations solving the problem, he may be found to take on this additional responsibility in furthering the war effort.

But in any sizeable community, it is obviously unwise for business to take on the responsibility of running a day nursery. Just because a man runs a good foundry certainly does not mean that he knows anything about the day nursery problem. Unless it is absolutely necessary, that responsibility is one that should be avoided.

He can be a good citizen in his community, and where the problem exists he can put his shoulders to the wheel and try to help solve it on a community basis.

As for the training time in putting women into foundry jobs, there is nothing one group can do for another without knowing the business. There are certain guides in training time which the United States Employment Service has collected over the country. The Employment Service would be the first to admit that the time required for training for different jobs change constantly, due to better understanding. A good training man can be of great assistance in working out a practical training program.

The Training Within Industry Division, War Manpower Commission, has been a great help in simplifying jobs, resulting in shorter training periods for women.

Management's Attitude Toward Women

In general, there are two different attitudes about the employment of women. One is: "Well, the government says we've got to pay equal pay for equal work and, if we're going to pay equal pay, these women are going to earn it. They are taking men's jobs, and that's all there is to it. Just let them take it!" Such managements take no responsibility for induction or for trying to recognize the psychological and environmental

Where Lynchburg Foundry Employs Women

In this article by Miss Southall, and an article in the June issue of American Foundryman by Dr. Paul A. Brehn of the Wisconsin State Board of Health, problems and possibilities of the employment of more women in foundries are discussed. How one large foundry company, Lynchburg Foundry, uses women extensively in both its Lynchburg and Radford, Va., plants, is told on page 10 and in accompanying illustrations.

background of the women who are coming into their plants.

The plants that have adopted that attitude have not been too successful in employment of women. The women have not particularly liked such an attitude. They can get a job some place else or they can stay home for a while, cause absenteeism, and eventually quit.

On the other hand, it is not a good practice to coddle women too much. We had to overcome this in some of the units in our company, where we have had women for a long time, where a kind of parternalistic attitude had developed in which everybody "points with pride" to the good-looking girls we have in this particular factory.

As technicians in the physical, sand and chemical laboratories of Lynchburg Foundry Co., women have been found very accurate, conscientious, and interested in their work. Drilling a cast iron test piece preparatory to making a chemical test.

Somewhere between the two attitudes, expecting a good day's work with no coddling and too much coddling, is fair treatment. However, there must be some understanding on the part of a supervisory organization that a woman is a little different physically from a man, that she is not quite as strong as a man, and that she is not used to taking the job quite as roughly as a man until she is adjusted.

There must be an understanding of the fact that she probably is doing two jobs, one at home and one in the shop. She should not be coddled too much, but management should try to understand her and her problems and make an effort to solve those two problems for her. That approach seems to give the best results in the introduction of women.

Training Women Supervisors

We all hear a great deal said, and practically all surveys show, that women do not like women bosses. Both men and women seem to have in mind the old type of forelady. Some of them are pretty tough!

However, many new women who have had training in supervisory courses are coming up through the ranks. They have had job incentive training instruction and are of a different type, just as much as the foreman with or without training. We would not be making any progress if we did not develop new type supervisors, and we must be open-minded to the idea of developing women into supervisory positions.

It may be impossible in some communities to get the right kind of women to be supervisors. If, by luck, a young woman is found, as happened in a large factory in Chicago, who is highly mechanical and well educated but, because she had a child, gave up the chance to train for ferrying bombers to the other side, it would be a mistake not to use her to the limit of her ability.

Harvester Training Program

The International Harvester Company is decidedly a man's organization. Never in normal times do we have more than perhaps 3 per cent of women in the company, including office employees.

Before we introduced women into any factories where we had not had them before, we picked out the most promising girls that we had in two or three plants where we had women for a long time. They were girls who knew the company's policies, girls who knew what it meant to turn out a good day's work, girls who had shown some

One of Lynchburg Foundry Company's girl employees in the sand laboratory, performing a hot strength test on cores.

leadership and had been group leaders. We sent those women to units that were used to handling women and trained them.

They went through 13 weeks of training. If they had assembly and inspection work, but not machine work, they were given machine experience. In addition, they had many hours of conference discussions to broaden them on company policy.

We have trained about 30 or 35 supervisors now, and those girls are told when they go into that training class that they are in the army. They are just like a Harvester man. If they are needed anywhere, such as St. Paul or Auburn, N. Y., they go, and they go to a plant before any women are hired. They check to see whether the plant has proper facilities, and proper facilities are getting to be a very difficult proposition.

Many firms today want to put women into their shops. Many firms are having to delay the introduction of women by three or four months because it takes that long, sometimes, to get three or five thousands dollars worth of equipment to provide proper facilities for women.

If any employer has an idea of using women in his foundry, he should make layouts and get his requests for materials in early, or he will slow up his entire program.

The Harvester woman supervisor, sent into a plant which has not used women before, inter-

Another illustration of how women do the work of men in the sand laboratory at Lynchburg Foundry Co. Performing a hot strength test on cores.

views the women who have already filed applications, finds out as much as she can about their family responsibilities and their health conditions, in addition to their knowledge, background and training for the jobs.

Training Plan Pays

These women supervisors stay very close to the first women hired. They watch all the rates of the women. If a woman is not earning as much as she should on piece work, they check into it and determine why. If the girl stays home, the supervisor interviews her and finds out what the reasons are, whether they are within the girl's control or within the company's control.

We have found that the plan has paid. Some of our superintendents, who were very much opposed to using women and much more opposed to women supervisors, have said that these girls are earning their salaries five times over because of the smooth running of the women's jobs and the excellent way the women are adjusting themselves in the factories.

We have one head woman supervisor in each plant, who is responsible for the work of the shift supervisors. We are now developing a short term foreman's training course. Our foreman's training course used to be four years. You cannot take that long to make a foreman now, so we have cut that to intensive training of about six months. That course is open to both men and women who show mechanical ability and leadership in the plant.

We have trained the chief supervisors. Women will move into the next level of supervisor as they qualify for the six months foreman's training. For the rank and file of new women employees, we have induction training that may be from one day to three days.

Post-War Problems of Women Employment

One question often asked is, "What about all these women? We certainly don't want all these women in foundries, steel mills, and so on, after the war is over! Are we going to have to put up with them forever, if we have them now?"

There have been some rather interesting checks made on that. One of the large steel companies asked the first groups of women who were brought in why they came to a steel mill to work, and the general trend of 80 to 90 per cent of the answers on that question was: "I came in to lick the Germans and the Japs. I don't particularly like to work in this steel mill, and as soon as the war is over I am going back home.

On the other hand, the best available statistics show that as a gradual course, after the last World War, perhaps the increase in total employment of women was around 20 per cent over pre-war figures. If we have any kind of expanding economy, it is safe to say that some of the women who will have made outstanding records in their jobs will be kept, because they want to stay and their employers have found them very useful.

However, the great bulk of women will be glad to go back home and not have to work shift hours, fix meals and leave them on the stove, eat cold foods and all the others things that most married women working today are having to do. There will not be a social revolution. There is one point of caution, however, because the following may easily happen.

When these women return home and the husband or son comes back from overseas and is working at the old job again, perhaps the one his wife has been doing, she probably will not be impressed by the following attitude, "Darling, this work in the shop is so awfully heavy and hard, I'm just worn out. Will you fetch my slippers and put them by the fire and get my supper ready?"

That woman probably will say, "Listen, brother! I worked in that shop when you were out, and I kept house, too. That job is a snap compared to waiting on you and four or five kids. You just rest yourself a minute and then come on out and dry the dishes for me later!"

Three women employees of Lynchburg Foundry Co., Radford, Va., plant, and one of the huge cores they made in the special foundry.

When one lone woman first invaded the Lynchburg plant of Lynchburg Foundry Co., it was something of a sensation. Today, however, women are being employed in the company's two plants in a large variety of jobs, and doing their work with considerable success. The following article may be of assistance to other foundries in placing women to overcome manpower shortages.

Where Women Are Employed in the Two Plants of the Lynchburg Foundry Company

By T. M. Bost, Jr.
Training Supervisor, Lynchburg, Foundry Co.

DUE to the manpower shortage in the area of its plants, the Lynchburg Foundry Co. was faced with the problem of employing women in the fall of 1942. Its personnel director, in discussing the situation with the management, decided that the introduction of women into the foundries should be done gradually.

The first step the company decided on was to replace men time-keepers and checkers in the plant offices with women, feeling that by doing so the men in the plant would become accustomed to women in the shop before they were actually put on any production jobs. These new clerks were found to be very efficient and cooperative in every way.

In January 1943, the first woman was put on a regular production operation in one of our small departments which produces small "peanut" cores. Shortly after this, several girls were placed in the special foundry core rooms making bench cores. Gradually, addition were made in both of these departments as men were called to the armed forces.

Mrs. Olivia Kidd, first foundrywoman employed by Lynchburg Foundry Co.—but by no means the last, as this article by Training Supervisor Bost indicates.

A short time later girls were placed in the machine shops on repetitive work, such as turret and small lathes. Girls have since been placed in the storerooms, on the gates, and as checkers and inspectors in the stock yards, also in the foundries reading the temperature of iron with an optical pyrometer.

While all of these additions were being made along the production lines, girls were used

Twenty-two women employees at the Lynchburg, Va., works, all of whom seem to enjoy their wartime status. Other women workers of Lynchburg Foundry Co. operate cranes, read furnace temperatures, make cores, run machine tools, work as checkers and inspectors, and work out successfully in storerooms, stock yards, and in the physical, chemical and sand laboratories.

Scenes in Lynchburg's testing laboratories. Left—Mulling a sample of a new molding sand. Right—Grinding an iron sample for carbon determination.

as replacements in the physical, chemical and sand laboratories. They were found to be efficient and accurate in running both quantitive and qualitative analyses.

The Lynchburg Foundry Co. has found that they could use women in their foundries to distinct advantage, in that they are quite dexterous on small jobs, are willing learners, and are most anxious to contribute their part to the war effort. With this in view, we will continue to use women as replacements, wherever possible, for the duration, in both our Lynchburg and Radford, Va., plants.

"E" Awards to More A.F.A. Members

INCREASING awards of merit for excellence in war production work are constantly being conferred upon members of the foundry industry, with A.F.A. members having a substantial representation among those honored.

The following companies are included in the latest number of firms to receive public recognition:

Herman Pneumatic Machine Co., Zelienople, Pa., first flew the "E" pennant on October 1.

On October 2 the National Engineering Co., Chicago, was officially informed that it, too, would receive this highest of government honors for patriotic service.

Minneapolis Electric Steel Castings Co., Minneapolis, unfurled its merit award on September 25.

The Ferro Machine and Foundry Co., Cleveland, received an "E" on September 17.

Saeger Heads Fluidity Testing Committee

C. M. SAEGER, Metallurgist, National Bureau of Standards, U. S. Department of Commerce, Washington, D. C., has been appointed chairman of the Fluidity Testing Committee of A.F.A. Long active in the committee work of the Association Mr. Saeger has contributed many papers on a variety of subjects. He was a co-worker in evolving the present standard A.F.A. fluidity test, and his appointment as chairman of the committee should instill new vigor into this group's activities.

The function of the Fluidity Testing Committee is to keep abreast of developments regarding the test and to continue to suggest any necessary changes to make its adoption by industry as wide as possible. In addition to Mr. Saeger, the other members of the committee are:

C. W. Briggs, Technical and Research Director, Steel Founders' Society of America, Cleveland.

C. K. Donoho, American Cast Iron Pipe Co., Metallurgist, Birmingham, Alabama.

G. P. Halliwell, Director of Research, H. Kramer and Co., Chicago.

C. F. Joseph, Metallurgist, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.

Max Kuniansky, General Manager, Lynchburg Foundry Co., Lynchburg, Virginia.

H. F. Taylor, Metallurbist, Naval Research Laboratory, Anacostia Station, Washington, D. C.

Wally George Joins Management Consultants

W. E. GEORGE, connected with the Campbell Wyant and Cannon Foundry Co., Muskegon, Mich., for the past six years, has joined the staff of Booz, Allen and Hamilton, 135 South La Salle St., Chicago, management consultants.

In his new work, Mr. George will follow the familiar lines of his foundry career, that of handling management engineering problems of wage incentives, time study, job evaluation, budgets and cost reduction analysis.

An active A.F.A. member, Mr. George has served on a number of committees, and is at present Vice Chairman of the Job Evaluation and Time Study Committee and the Foreman Training Committee.

A.F.A. Group to Study Casting Inspection

A NEW Committee on Inspection of Castings has been set up by the American Foundrymen's Association, due to the growing demand for more critical inspection and more rigid specifications for war production castings.

The committee will stress means and methods for improv-

A woman lathe operator watches her job intently at the Lynchburg Foundry Co. Many other kinds of work are performed at this plant by the "weaker sex."

ing the quality of castings mainly from the purchasers' point of view. Heretofore, attention has been directed largely to meeting physical requirements through such tests as tensile, tension, hardness and other mechanical properties as measured by testing machines.

Results of the committee's work will first be presented to the industry at the 1944 War Production Foundry Congress.

Members of the committee, for which no chairman has as yet been appointed, include:

M. D. Johnson, Caterpillar Tractor Co., Peoria, Ill.

E. Platt, Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

D. E. Harvey, Bay City Div., Dow Chemical Co., Bay City, Mich.

F. Poettgen, American Steel Foundries, Cast Armor Plant, East Chicago, Ind.

C. K. David, Continental Roll & Steel Fdy. Co., East Chicago, Ind.

Harold Warner, Allis-Chalmers Mfg. Co., Milwaukee.

H. C. Stone, Belle City Malleable Iron Co., Racine.

E. G. Leverenz, American Steel Foundries, Indiana Harbor Works, East Chicago, Ind.

The work was judged by a committee composed of members of the A.F.A. Southern California Chapter, with cash prizes being awarded.

This kind of cooperation between foundrymen and students is insurance that the foundry industry of the future will continue to have a "place in the sun."

A.F.A. Members Foster Local High School Foundry Club

By Ralph Wertz
Fullerton Union High School and District Junior College
Fullerton, Calif.

AN EXAMPLE of the good that results from the interest of local foundrymen in the foundry students in the vicinity is the friendly spirit existing between the Southern California Chapter and the Fullerton Union High School and District Junior College, Fullerton, Calif.

The foundrymen cooperated with the boys in seeing that the school's foundry club, under the guidance of Ralph Wertz, foundry instructor at the school, had the benefit of the practical knowledge which the local foundrymen could supply.

Speakers at the club's different meetings were A.F.A. members who mingled with the boys and encouraged them in selecting foundry work as a career. This created a new incentive for greater effort on the part of the boys and resulted in satisfactory placements of the graduate students.

It is only because of restrictions imposed by the war—gasoline and tire rationing, and unexpected blackouts—that the club was forced to discontinue activities for the duration.

Membership in the student organization was voluntary to those boys interested in obtaining a broader scope of foundry possibilities, and the meetings were well attended. At one of the latest gatherings, the boys demonstrated molds, cores and their ability to operate a cupola.

Ralph C. Noah with S. F. Iron Foundry

IN THE Directory of A.F.A. Chapters published in the September issue of American Foundryman, Ralph C. Noah, Vice-Chairman of the Northern California Chapter, was listed as being connected with the San Francisco Stove Works. Thanks to Chapter Secretary-Treasurer Geo. L. Kennard, Northern California Foundrymen's Institute, we now learn that Mr. Noah's company connection is the San Francisco Iron Foundry of San Francisco.

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A valuable, basic book for the study of Cast Iron Metallurgy—prepared especially for foundries who do not have their own trained metallurgical staff. The practical foundryman will find much to aid him in the production of high quality cast iron in meeting rigid Government wartime specifications. 150 pages, full cloth bound, with numerous photomicrographs of cast iron, at magnifications as high as 4500x.

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☐ Send invoice.

The Office of Metals Controller, Dept. of Munitions and Supply, Ottawa, Canada, has issued the following recommended practice for the casting of non-ferrous test bars, as formulated by the Non-Ferrous Castings Advisory Committee. The recommended practice, issued September 27, 1943, is reproduced here because of its interest to the copper-base alloy castings manufacturers in both Canada and the United States.

Recommended Practice for Non-Ferrous Test Bars and Their Pouring Temperatures

IN ISSUING this recommended practice, the Non-Ferrous Castings Committee had the following objects in view:

1. To standardize Canadian foundry procedure in the casting of non-ferrous test bars.
2. To conserve labor and materials so vital to the war effort, by reducing the number of rejections caused by a lack of knowledge in the proper technique of casting test bars.
3. To assist those foundries which are unfamiliar with the recognized methods of obtaining the best physical properties of the metals with which they are working.
4. To assist those foundries which have never been called upon to supply castings to physical specifications.

The Value of a Test Bar

A test bar cast under carefully controlled conditions is recognized by the committee as being only a guide to the quality of the metal in a casting or group of castings, and in no way should its physical properties be considered as representing the physical properties actually existing in the casting. The physical properties of the test bar, coupled in most cases with the analysis, do, however, constitute the only practical guide to the inspection authorities as to the quality of the castings.

Table I

TYPES OF TEST BARS AND THEIR POURING TEMPERATURES

	Committee's Recommendation KEEL BLOCK Test Bar *Deg. F*	*Alternative* U. S. NAVY Test Bar *Deg. F*
A. *High Shrinkage Alloys*		
Silicon Bronze		
(1) High Zinc Content (10 per cent zinc and over)	1850	1850
(2) Low Zinc Content	1900	1900
Manganese Bronze		
(1) High Tensile (90,000 psi. tensile and over)	1950	1950
(2) Low Tensile (less than 90,000 psi. tensile)	1850	1850
Naval Brass	1850	1850
B. *Tin Bronzes, Red Brass and Semi-Red Brasses*	CROWN Test Bar	WEBBERT Test Bar
(a) Phosphor Bronze	*	*
(b) Tin Bronze, Red Brasses and Semi-Red Brasses	2100	2100

*Pouring temperature of phosphor bronze will depend upon the quantity of phosphorus present and will range from 1800°F. to 2100°F.

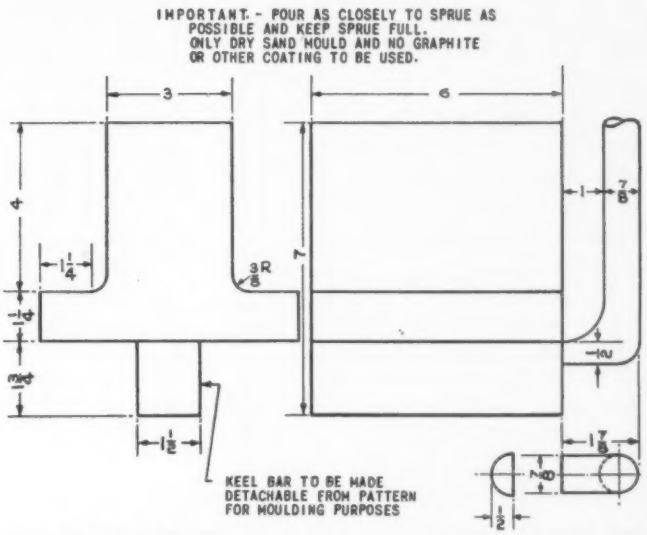
IMPORTANT.- POUR AS CLOSELY TO SPRUE AS POSSIBLE AND KEEP SPRUE FULL. ONLY DRY SAND MOULD AND NO GRAPHITE OR OTHER COATING TO BE USED.
3
6
4
1 7/8
1 1/4
3R/8
7
1 1/2
KEEL BAR TO BE MADE DETACHABLE FROM PATTERN FOR MOULDING PURPOSES

Fig. 1—The keel block test bar, as recommended by the committee for the high shrinkage alloy group. Dimensions shown in inches.

It therefore follows that it is not the intention of the committee to overemphasize the value of a test bar, and foundries should not overlook the fact that the same care taken in making a sound casting should be duplicated in the test bar.

Cast—On Bars vs. Separately Cast Bars

The committee condemns the practice of attaching test bars to the casting, and recommends that all test bars be cast in a separate, especially prepared mold.

This recommendation is based on the fact that it is, in most cases, difficult to attach a test bar to a casting which will be adequately fed during solidification. It is most likely that the test bar will feed the casting or the casting feed the test bar and such conditions are to be avoided.

Dry Sand vs. Green Sand Molding

The committee recommends that all test bars be made in dried sand molds without the use of facing materials to eliminate the factor of moisture affecting the physical properties of the test bar. The mold should be allowed to cool to room temperature before casting the test bar.

Melting

The committee recommends that all non-ferrous alloys be melted under slightly oxidizing conditions. This procedure is recognized as yielding

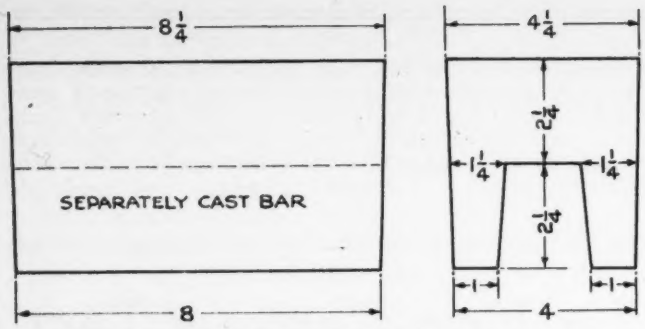

Fig. 2—The U. S. Navy standard test bar, which may be used as an alternative to the keel block. Dimensions shown in inches.

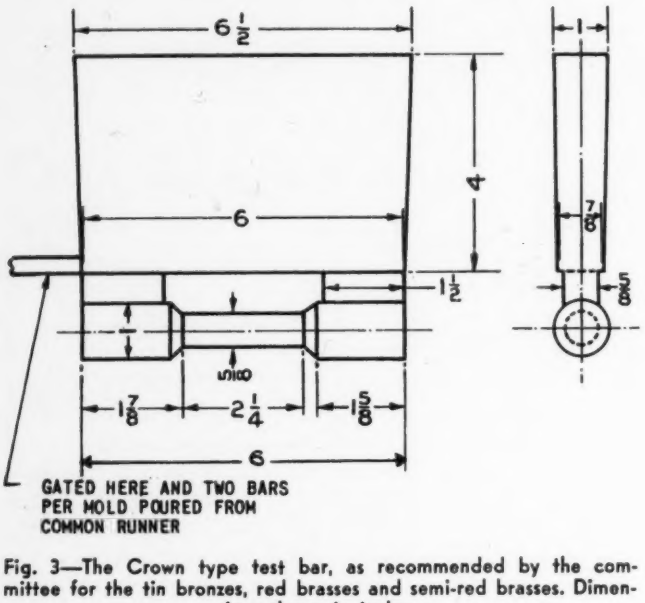

Fig. 3—The Crown type test bar, as recommended by the committee for the tin bronzes, red brasses and semi-red brasses. Dimensions shown in inches.

the best results in practice. Those alloys, such as the tin bronzes and red brass which require deoxidation, should be deoxidized thoroughly with phosphor copper immediately before pouring the test bar mold.

Pouring

The committee recommends that the test bar be poured from the same heat of metal as the casting it represents and, if practical, from the middle of the pour. The latter condition must, however, coincide with the optimum pouring temperature for the type of metal and test bar.

Pyrometric Control

The committee recognizes that test bars cast under conditions of varying temperature will lead to varying results and, therefore, recommends that all test bars be cast under pyrometric control. The correct pouring temperature is a constant factor for any given metal cast in a given type of test bar. For example, "B" metal cast in a dry sand Crown type test bar mold has one pouring temperature that will yield the maximum physical properties.

Cooling

The committee recommends that the test bars be allowed to cool in the mold for at least three hours after pouring, and under no circumstances should they be quenched in water or other cooling medium. The exceptions to this rule are test bars of heat treatable aluminum bronze with a combined iron, manganese and nickel content of less than 3 per cent.

Aluminum bronze with a combined iron, manganese and nickel content over 3 per cent does not need to be quenched to develop its full physical properties.

Radius of the Machined Test Bar

As illustrated in Fig. 5, the committee recommends that the minimum radius of the shoulder of the test bar should not be less than 3/8 in.

Conclusion

While it is recognized by the committee that there are other types of test bars which will yield satisfactory results, the recommendations of the committee, as made, are considered the best for the alloys under consideration. It is sincerely hoped that the foundry industry will benefit from the experience of the members of the Non-Ferrous Castings Advisory Committee, personnel of which was as follows:

Capt. (E) A.C.M. Davy, Dept. of National Defense, Naval Service, R.C.N.

Flt. Lieut. H. R. Foottit, R.C.A.F.

G. E. S. Hornby, British Admiralty Technical Mission, Ottawa.

H. H. Scotland, Inspection Board of the United Kingdom and Canada.

Norman MacPhee, Dept. of Mines and Resources, Ottawa.

Prof. J. U. MacEwan, Dept. of Munitions and Supply, Ottawa.

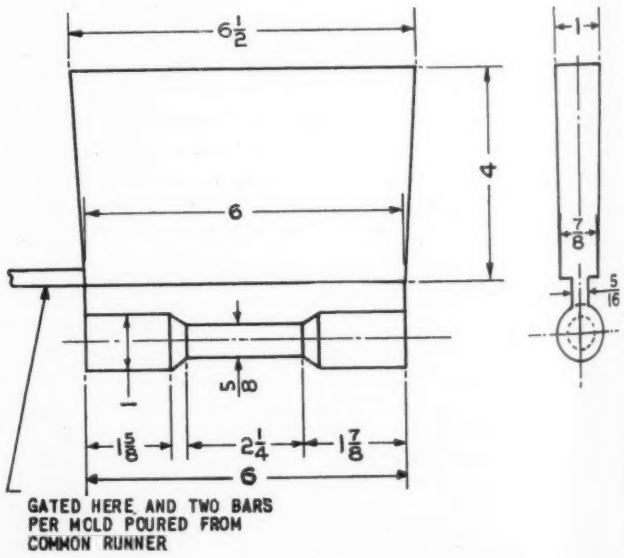

Fig. 4—The Webbert type test bar, which may be used as an alternative to the Crown type bar for the tin bronzes, red brasses and semi-red brasses. Dimensions shown in inches.

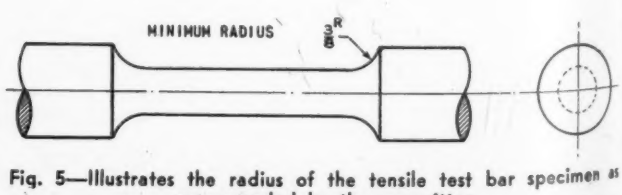

Fig. 5—Illustrates the radius of the tensile test bar specimen as recommended by the committee.

W. L. Bond, Ottawa Car & Aircraft, Ottawa.
A. E. Cartwright, Robert Mitchell Co. Ltd., Montreal.
G. E. Tait, Dominion Engineering Works Ltd., Montreal, P. Q.
J. C. Stavert, Babcock-Wilcox & Goldie McCulloch Ltd., Galt, Ont.
J. Sully, Sully Brass Foundry Ltd., Toronto.
Bernard Collitt, Jenkins Brothers Ltd., Montreal.

K. H. J. Clarke, Chairman, Office of the Metals Controller.
A. C. Boak, Vice-Chairman, Office of Metals Controller.
E. G. Jennings, Secretary, Office of the Metals Controller.
A. R. Neville, Office of the Metals Controller.
L. H. Burleigh, Office of the Metals Controller.

Directs Gas Institute At Illinois Tech

THE appointment of J. I. Yellott as full-time director of the Institute of Gas Technology at the Illinois Institute of Technology, Chicago, was made September 1.

Prof. Yellott has been chair-

J. I. Yellott

man of the department of mechanical engineering for the past three years, becoming director of the war production training program in 1941.

More than 36,000 persons have been trained in the war production training program directed by Prof. Yellott, making his program the largest in the nation in a single city and at a privately-operated college. In connection with his duties as head of this program, he helped to organize an explosives safety school for the office of the chief of ordnance of the War Department.

Propose 6th Code on Industrial Hygiene

A NEW industrial hygiene code, known as the "Code of Recommended Practices for Industrial Housekeeping and Sanitation," has been developed by the A.F.A. Committee on Industrial Hygiene Codes, of which Jas. R. Allan, International Harvester Co., Chicago, is chairman. The new code, sixth to be prepared by the committee, is now being submitted for approval by the Association, and is expected to be ready for distribution to the industry early in November.

The scope of the code is stated as follow: "This recommended good practice code describes the necessary fundamental engineering and construction information for the layout, design, installation and maintenance of wash, locker, rest, toilet and lunch rooms, and general industrial housekeeping and sanitation facilities for the protection of health and safety of persons and the promotion of good industrial relations."

Serving with Mr. Allan on the committee are the following prominent men:

S. B. Hansen, International Harvester Co., Chicago.
E. O. Jones, Belle City Malleable Iron Co., Racine, Wis.
H. G. Gregg, Dodge-Chicago Plant, Chicago.
C. P. Guion, W. W. Sly Mfg. Co., Chicago.
C. C. Hermann, Claude D. Schneible Co., Chicago.
C. F. Larsson, American Air Filter Co., Chicago.
S. McMullan, Western Electric Co., Cicero, Ill.
Nathan Lesser, Deere & Co., Moline, Ill.
R. W. McCandlish, Research Corp., Chicago.
R. B. Parker, American Brake Shoe & Foundry Co., New York.
B. A. Parks, Crane Co., Chicago.
John F. Tobin, American Blower Corp., Chicago.
Secretary, H. Hanson (Miss), American Foundrymen's Association.

The previous five codes developed by this committee have been extensively recognized by engineering groups and state departments as most worthwhile in outlining acceptable minimum requirements. They cover the following subjects:

Recommended Practices for Testing and Measuring Air Flow in Exhaust Systems.

Recommended Practices for Grinding, Polishing and Buffing Equipment Sanitation.

Good Practice Code and Handbook on Fundamentals of Design, Construction, Operation and Maintenance of Exhaust Systems.

Operation and Maintenance of Exhaust Systems.

Recommended Good Practices for Metal Cleaning Sanitation.

Recommended Good Safety Practices for the Protection of Workers in Foundries.

Hamilton Employees Make Safety Record

THERE are a lot of working days between May 4 and August 16—104 to be exact—and that is the length of time that the Hamilton Foundry and Machine Co., Hamilton, Ohio, operated without a lost time accident.

The period totaled 350,000 man hours of safe working, and it is a record of which any plant could be proud. The mounting figures of no-accident days, displayed on the bulletin boards located throughout the plant, served as constant reminders to the employees that a record was being established, and everyone cooperated by exercising extra caution and care.

Augmenting this fine safety record is the Army-Navy "E" award recently conferred upon the company.

Had it not been for sturdy safety shoes, this employee of the Hamilton Foundry & Machine Co., Hamilton, Ohio, might have suffered a severe foot injury. If that had happened, the company's recently established safety record would have stopped on the hundredth day.

This article, treating of the ease of operation effected by the author's redesign of brass melting furnaces, appeared in the December, 1942, issue of "Canadian Machinery and Manufacturig News." The redesign also simplified maintenance routine, of considerable importance with today's high production schedules, by making all vital parts readily accessible.

Brass Furnace Redesigned for Accessibility

By T. Henry
Plant Engineer, Crouse Hinds Co. of Canada Ltd.

FOR many years it has been the custom, in melting nonferrous metals in the higher temperature range, to use a tilting type furnace above the floor level, or a removable crucible below floor level in a pit.

The pit idea was, of course, the most convenient and practicable when coal or coke was used as fuel. However, with the advent of gas or oil firing, with the necessity of enclosing each crucible in a separate furnace, the need for using a pit no longer existed. It was continued because of prevailing custom.

When the Cross-Hinds Co. of Canada installed its first bronze furnaces, the usual practice was followed. They were located in a pit with their tops about eight inches above the floor level. These furnaces were of the well-known crucible stationary type, consisting of a steel cylinder lined with refractory brick, having a tunnel in one side near the bottom for the gas or oil nozzle and a hole in the opposite side near the bottom for slag and spilt metal.

It will be readily understood that this arrangement made it practically impossible to keep the furnaces in continuous service, because of maintenance difficulties. These difficulties were due largely to faulty design of the furnaces and improper location.

For instance, if it became necessary to make repairs to the burner nozzle or connections, or repair the furnace lining, or even clear the slag hole, it was difficult and sometimes impossible because other furnaces were in operation in the same pit. This condition became even worse if a crucible cracked or developed a leak while in the furnace, the metal sometimes "freezing up" in the slag hole, causing it to back up into the burner tunnel.

Eliminates Faults

When an opportunity arose, the writer decided to redesign the furnaces and relocate them above the floor level. These changes were made as follows:

The furnaces were completely dismantled, a circular hole was cut in the bottom of the steel shell, having a diameter equal to the internal diameter of the furnace, thus leaving an annular portion to support the brick lining. When the lining is in place, it is in the form of a cylinder open at both ends, as shown in Fig. 1-B, which also indicates a removable bottom in place.

Repair Is Simplified

This removable bottom is shown in Fig. 1-C. This consists of a circular steel plate of the same diameter as the steel shell of the furnace, with a 4-in. circular hole in the center, four reinforcing pieces with slotted ends welded to the under side, and a steel ring welded to the upper side. The ring is for the purpose of centering the precast refractory furnace bottom which the steel plate supports. The four arms, with slotted ends, are for supporting bolts which have their upper ends engaged in slotted lugs welded to the furnace shell.

This assembly is shown in Fig. 1-B, and the unusual length of these bolts is so that they can be easily pulled out with a bar if it became necessary to clear the furnace while hot, in the event of a broken crucible.

Pot Rest

Fig. 1-B also shows a cross section of the pot rest in place, with provision made for allowing slag or metal to run out through the hole in the bottom. While the pot rest is of the usual cylindrical form, it has a dome-shaped cavity on the under side with four small horseshoe tunnels radiating from it.

As the upper side of the furnace bottom has been built up

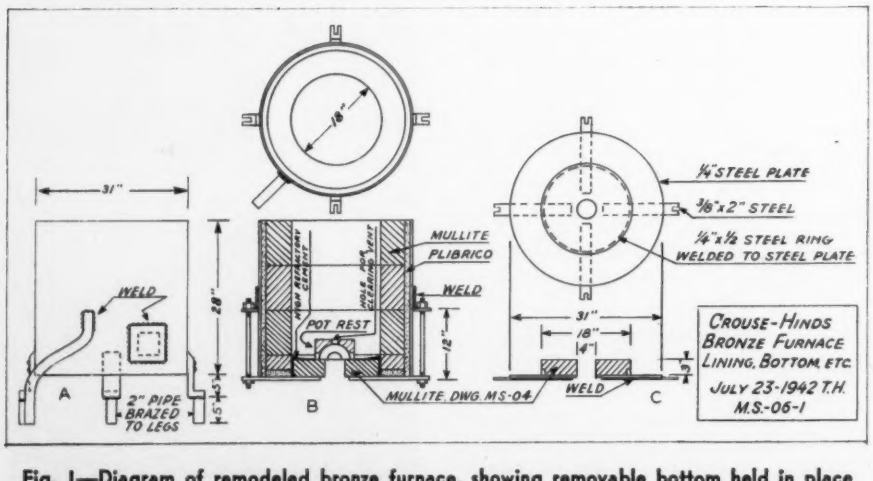

Fig. 1—Diagram of remodeled bronze furnace, showing removable bottom held in place by bolts that can be pulled out with a bar, if necessary, while furnace is hot.

with cement or plastic brick in order to slope toward the center, any slag or spilt metal will flow to the center and out through the hole provided. It also will be noticed that there is a small hole through the center of the pot rest; this is for the purpose of using a bar to clear the lower hole without disturbing the pot rest. This hole is covered when the pot is on the rest. Experience has shown that this method of draining through the bottom takes care of most troubles, and it is only necessary to drop the bottom when a bad break occurs and the center hole "freezes up."

The pot rest described is a precast form made of a high grade of refractory material, but it is not necessary to go to that expense as the bottom of an old crucible can easily be cut to approximately the same shape, and it has the additional advantage of being broken up with ease if difficulty is experienced in clearing the outlet.

Fig. 1-A shows a steel patch welded over the old slag hole. With this hole eliminated, there is no break in the furnace lining except the burner tunnel; this helps considerably to lengthen the life of a lining.

Fig. 1-A also shows that 5-in. lengths of 2-in. pipe were brazed on to three of the cast iron feet, with which the furnace was originally equipped. This was done to give a 10-in. clearance under the furnace in order to pull out the removable bottom with pot rest, if it became necessary to drop it in the event of a broken crucible.

The fourth leg has been removed to give width for the same purpose and, in place of this leg, a long sweep support was welded to the furnace shell, having sufficient offset to allow the bottom to be withdrawn.

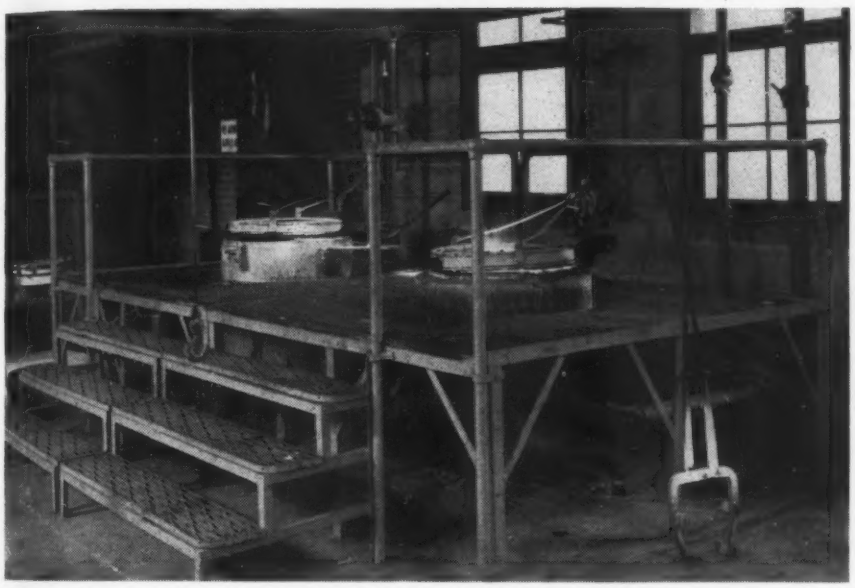

Fig. 2—Remodeled brass furnaces, set up on floor level and surrounded by steel walkway for ease of operation and maintenance. Prior to remodeling, furnaces were of the stationary pit type.

The accompanying photograph (Fig. 2) shows how the furnaces were finally set up on the floor level, surrounded by a steel grating walkway, supported by an angle iron frame. This makes all vital parts readily accessible, thereby simplifying maintenance work. The steel grating walkway is in two sections for each furnace so that it may readily be removed for major repairs or replacements, or in case of emergency.

Women Workers Need Safety Instruction

ACCIDENTS among women employees in industrial plants, working with ever-present physical hazards, have emphasized the need for making the women safety conscious.

The report of a study conducted by the Group Insurance Division of the Metropolitan Life Insurance Co. shows the advantage of safety training among women from the start of the workers' periods of employment.

The report covers different considerations in the hiring of women, from a course in orientation to overcoming resistance to company safety uniforms. Copies of the study are available to business executives who address the Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York.

Lee Everett Writes From Overseas Post

THE many foundrymen friends of Lee Everett, now a Major in the Air Corps, will be glad to know that the national office of A.F.A. heard from him recently from overseas. Just where he is located is, of course, a military secret, but it is no secret that he has been working mighty hard with an Advanced Air Service unit, and has carried into the service his broad experience in foundry and engineering layout and services.

Lee, it will be remembered, went into service from the Kaukauna Machine Co., Kaukauna, Wis., where he was foundry superintendent. He previously had been connected with other foundry firms where he became well known. Those desiring to write him (and what soldier does not like to hear from "the gang back home?") should address him: L. E. Everett, Maj. A.C., 3rd Strategic Air Depot, A.A.F. Sta. 505, A.P.O. 635, New York.

Safety measures to be taken in the handling of heavy materials by mechanical means are detailed in an article by Chas. T. Pope, chief safety engineer, Consolidated Steel Corp., Ltd., Wilmington, Del., in the June, 1943, issue of *California Safety News*. The importance of equipment maintenance, education of operators, adequate night lighting and proper signaling devices are discussed.

New Association Members

Once again our Chapter Membership Committees "went to town," reporting a total of 160 new members during Sept. 15-Oct. 16, against 139 during the same period a year ago. Chapter representation was almost 100%, 23 Chapters contributing to the total, which included 22 Company Members. Leading the list was Chicago with 26 new members. Runners-up were: Detroit 15, Eastern Canada and Newfoundland 13, Chesapeake 12, Southern California 10. With such splendid cooperation, A.F.A. is bound to keep right on growing!

(September 16 to October 15, 1943)

SUSTAINING

***United Iron & Metal Co., Baltimore, Md. (Jacob S. Shapiro)**

CONVERSIONS

Sustaining from Company

***Koppers Co., American Hammered Piston Ring Div., Baltimore, Md. (R. T. Covington, Foundry Supt.)**

***Star Pattern & Model Works, Inc., Rockford, Ill. (Harold Hasselroth, Secy.)**

Company from Personal

***Paul Pufahl & Son Foundry Co., Minneapolis (Sheldon Pufahl, Mgr.)**

Birmingham Chapter

John Ansley, General Yard Foreman, U. S. Pipe & Foundry Co., Bessemer, Ala.

J. Lester Davis, Supt. of Malleable Foundry, Stockham Pipe Fittings Co., Birmingham, Ala.

William Cooper Smith, Chief Chemist, U. S. Pipe & Foundry Co., Bessemer, Ala.

Central Indiana Chapter

Cecil Bess, Planning Supv., Perfect Circle Co., Newcastle, Ind.

Harold Hoover, Molding Foreman, Perfect Circle Co., Newcastle

Harry May, Asst. Met., Perfect Circle Co., Newcastle

S. A. Norrick, Gen. Foundry Engr., Perfect Circle Co., Newcastle

Raymond E. Thomas, Secy.-Treas., Indianapolis Brass & Aluminum Foundry Co., Indianapolis

Central New York Chapter

John Feola, Foreman of Non-Ferrous Foundry, Crouse-Hinds Co., Syracuse, N. Y.

Chesapeake Chapter

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Paul H. Anderson, Heat Treating Supv., Koppers Co., American Hammered Piston Ring Div., Baltimore, Md.

Ralph H. Brouk, Met., Naval Research Laboratory, Washington, D. C.

Col. Lynn Chu, Comm. on Aeronautical Affairs of Republic of China, Washington

Harold S. Hedberg, Chemist, Koppers Co., American Hammered Piston Ring Div., Baltimore

Lloyd A. Howell, Foreman Pattern Shop, Newport News Shipbuilding Co., Newport News, Va.

Ben A. Kornhauser, Met. Engr., U. S. Navy Bureau of Aeronautics, Washington

Blake M. Loring, Met., U. S. Naval Research Laboratory, Bellevue, Washington

Edwin T. Myskowski, Met., U. S. Naval Research Laboratory, Washington

George J. Rossmarck, National Engineering Co., Baltimore

Arthur B. Shuck, Asst. Met., Koppers Co., American Hammered Piston Ring Div., Baltimore

***United Iron & Metal Co., Baltimore (Jacob S. Shapiro)**

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Russell G. Charles, Foreman, Continental Roll & Steel Foundry Co., East Chicago

Stanley F. Cieslak, Foundry Foreman, Howard Foundry Co., Magnesium Div., Chicago

Ralph D. Cole, Foreman, Howard Foundry Co., Magnesium Div., Chicago

Lawrence W. Curtis, Foreman, Continental Roll & Steel Foundry Co., East Chicago

C. K. David, Chief Inspector, Continental Roll & Steel Foundry Co., East Chicago

Gordon Davis, Foreman, International Harvester Co., Chicago

Wally E. George, Staff Supv., Booz, Allen & Hamilton, Chicago

Harry G. Gragg, Ventilation Engr., Dodge Chicago Plant, Chicago

Mark G. Hedges, Foreman, Continental Roll & Steel Foundry Co., East Chicago

William R. Herrmann, Furnace Room Foreman, Howard Foundry Co., Magnesium Div., Chicago

Stanley W. Hoenes, Howard Foundry Co., Magnesium Div., Chicago

Floyd Holben, Gen. Foreman, Howard Foundry Co., Magnesium Div., Chicago

Harold B. Jones, Chief Inspector, Calumet Steel Castings Corp., Hammond, Ind.

Stanley E. Lifford, Foreman, Howard Foundry Co., Magnesium Div., Chicago

Frank J. Lukowitz, Supv., Western Electric Co., Chicago

Daniel H. Miner, Foundry Foreman, Howard Foundry Co., Magnesium Div., Chicago

John Murchek, Jr., Foreman, Continental Roll & Steel Foundry Co., East Chicago

Roy F. Nosek, Demonstrator, The Beardsley Piper Co., Chicago

Bruno Olynik, Night Supt., Howard Foundry Co., Magnesium Div., Chicago

Frank T. Rourke, Asst. Plant Mgr., Howard Foundry Co., Magnesium Div., Chicago

J. B. Scott, Material Service Co., Chicago

Charles G. Sheahan, Prodn. Mgr., Howard Foundry Co., Magnesium Div., Chicago

LeRoy E. Taylor, Engr. of Tests, Illinois Clay Products Co., Chicago

Robert W. Van Brunt, Met., Howard Foundry Co., Magnesium Div., Chicago

John Brown Watson, Foundry Engr., Howard Foundry Co., Magnesium Div., Chicago

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I. J. Rand, Ingersoll-Rand Co., Cincinnati

George Riesenberg, Jr., Met., American Rolling Mill Co., Middletown, Ohio

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***Peters-Dalton, Inc., Detroit (O. Fenn, Engr.)**

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James F. Chamberlain, Service Engr., Peninsular Grinding Wheel Co., Detroit

A. J. Dalton, Vice-Pres.-Gen. Mgr., Peters-Dalton, Inc., Detroit

H. A. Kelley, Sales Mgr., City Pattern Foundry & Machine Co., Detroit

W. C. Newhams, Met., Dow Chemical Co., Bay City, Michigan

John H. O'Sullivan, Dist. Sales Mgr., Peninsular Grinding Wheel Co., Detroit

Vaughan C. Reid, Met., City Pattern Foundry & Machine Co., Detroit

J. L. Riley, Foundry Foreman, City Pattern Foundry & Machine Co., Detroit

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Robert E. Schenck, Chief Met., Aluminum Co. of America, Detroit
Carl A. Wagner, Pontiac Motor Div., General Motors Corp., Detroit
Hugh G. Webster, Chief Chemist, Kolene Corp., Detroit
A. Cree Wheat, Supt., Aluminum Co. of America, Detroit

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*Enamel & Heating Products, Ltd., Sackville, N. B. (Hyman Goldstein, Works Mgr.)
Aime Gauthier, Cupola Foreman, Canadian Car & Foundry Co., Ltd., Turcot Works, Montreal
*Gurney Foundry Co., Ltd., St. Laurent de Montreal, Que. (A. G. Fuller, Plant Mgr.)
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D. Johnson, Foundry Foreman, Gurney Foundry Co., St. Laurent de Montreal, Que.
John McCallum, Grey Iron Foundry Foreman, Canadian Car & Foundry Co. Ltd., Turcot Works, Montreal
T. Munro, Asst. Foundry Foreman, Gurney Foundry Co., St. Laurent de Montreal
Harold Robb, Canadian Foundry Supplies & Equipment Ltd., Montreal
John Shewan, Wheel Foundry Foreman, Canadian Car & Foundry Co. Ltd., Turcot Works, Montreal
G. D. Trumbull, Supt. of Iron Foundries, Canadian Car & Foundry Co. Ltd., Turcot Works, Montreal
E. C. Winsborrow, Chief Chemist, Canadian Car & Foundry Co. Ltd., Turcot Works, Montreal

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W. N. Leeke, Foundry Inspector, Bendix Aviation Corp., South Bend

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Larry Lind, Expediter, Vulcan Foundry Co., Oakland
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Don J. Merwin, Asst. Supt., Eastern Malleable Iron Co., Wilmington, Del.

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Henry Salinger, Asst. Met., Banner Iron Works, St. Louis
Robert N. Weidner, Met., Banner Iron Works, St. Louis

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Ralph H. McConnell, Casting Expediter, Axelson Manufacturing Co., Los Angeles
Paul Mozzini, Core Room Foreman Asst., Axelson Manufacturing Co., Los Angeles
G. J. Nass, Steel Foundry Supt., Kinney Iron Works, Los Angeles
Louis A. Pokorny, Asst. Foreman, Axelson Manufacturing Co., Los Angeles
M. S. Robb, Sales, Bethlehem Steel Co., Vernon, Calif.
Karl R. Roberts, Cleaning Dept. Foreman, Axelson Manufacturing Co., Los Angeles

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A. R. D. Kirby, Section Mgr., Stanton Ironworks Co. Ltd., Nottinghamshire, England
*Mabry Foundry and Machine Co., Beaumont, Texas (Hampton Mabry, Vice-Pres.)
*Marshall Car Wheel & Foundry Co., Marshall, Texas (C. C. Esdale, Supt.)
*Mills & Munro, Annandale, Sydney, Australia (R. A. Munro)
*Northwest Stove & Furnace Works, Inc., Portland, Ore. (W. R. Pindell, Mgr.)
*Pacific Iron & Steel Works, Tacoma, Wash. (A. Worley, Vice-Pres.)
*Western Foundry Co., Portland, Ore. (Edw. G. Huffschmidt, Gen. Mgr.)
*Wilde Co., Vancouver, Wash. (Geo. H. Wilde, Mgr.)
Edward J. Williams, Chief Industl. Engr., American Chain & Cable Co., Bridgeport, Conn.

Book Review

Slide Rule Simplified, by C. O. Harris, gray cloth bound, 266 pages. Published by American Technical Society, Chicago. Price of the book and a Dietzgen slide rule, $3.50; price of book alone, $2.50.

The book should be of great value to both beginners and those having previous slide rule experience, for the author has given excellent instruction in how to use a slide rule to its greatest advantage.

The first eight chapters discuss fundamental arithmetic operations — multiplication, division, the square, square root, the cube, and cube root. Foreseeing the usual difficulties of the beginner, the author has emphasized accurate and precise reading of the scales and locating the decimal point. Careful study of the first eight chapters of this book should enable any person with a knowledge of elementary arithmetic calculations to perform them on the slide rule.

The remainder of the book takes up more advanced operations and should be of interest to those having previous experience with a slide rule or those intending to use higher mathematics.

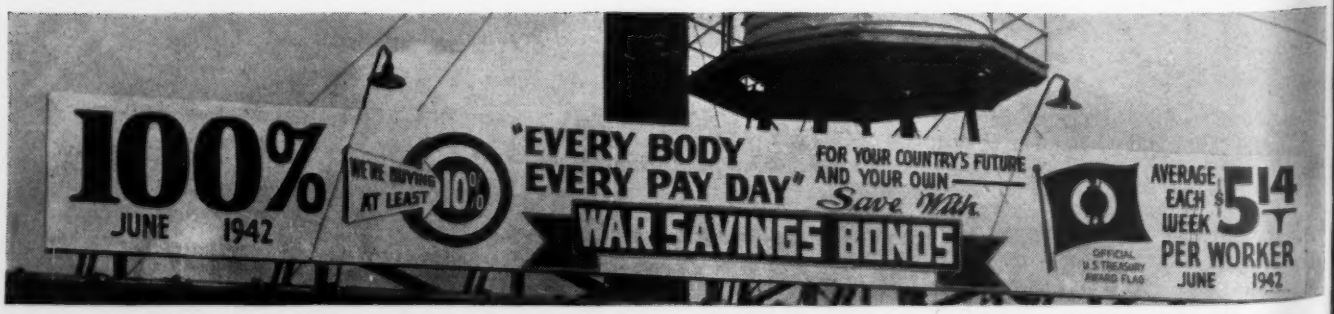
Each operation is clearly explained and illustrated by practical examples. Sketches picturing the steps in examples make the explanations even more complete. Since practice is essential in acquiring knowledge and skill in using a slide rule, many practice problems have been furnished.

The problems are representative of the type which the reader might solve with a slide rule. Rules are given for locating the decimal point by means of the "digit count" system. Chapters are followed by review problems which are useful at class examinations or self tests.

For those who enjoy mathematics or who wish to know why the slide rule works as it does, the basis of each operation is explained by means of logarithms.

The text was written specifically for the use of a 10-in. Mannheim rule, for this is the simplest and most widely used rule, and illustrations in the book were prepared from this rule. However, the operation of all slide rules is essentially the same. Variations found on other types of slide rules are discussed following the description of the operation in which they used.

A recent report on methods of organizing waste-reduction activities among employees was recently released by the Policyholders Service Bureau, Group Insurance Div., Metropolitan Life Insurance Co., New York. Included in the report are two check lists, one suggesting 70 points where interest and cooperation of personnel can help cut down unnecessary waste in time, materials and supplies, machinery and equipment, utilities and space. The second list contains a 14-point plan of employee cooperation as used by one company in its war on waste.



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Southern California Chapter

C. K. Faunt
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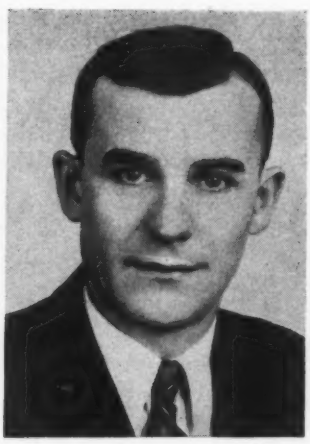
Director
Chicago Chapter



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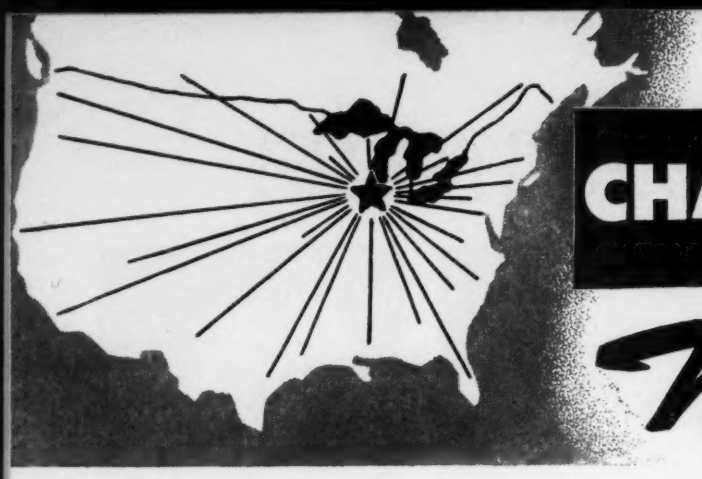

CHAPTER ACTIVITIES News

See page 25 for list of Chapter representatives whose reports of local activities appear in this issue.

Chicago Chapter Breaks All Previous Attendance Records

OVER 315 members and guests, the largest attendance at any regular meeting ever held by the Chicago Chapter, attended the October 4 meeting at the Chicago Bar Association Restaurant, Chicago. The large number of plant men present evidenced the broader interest being shown in A.F.A. Chapter activities all over the country.

Chapter Chairman Max Becker, Whiting Corp., Harvey, Ill., presided, and called on several committee chairmen for reports. Bruce Simpson, National Engineering Co., announced completion of the first class in iron metallurgy at the Illinois Institute of Technology, conducted under the War Training Branch of the government.

The class, he stated, was oversubscribed, members attending being picked by their companies. Fifteen graduates attended the Chapter meeting and were awarded certificates for completion of the course, classes of which were conducted after working hours. Arthur Spinoza, Griffin Wheel Co., received from the Chicago Chapter an award of $10 in war stamps for graduating with the highest mark.

Prof. J. I. Yellott, in charge of war training courses at Illinois Tech, spoke briefly on the course. Mr. Simpson then introduced the class instructor, Chas. Walton, Association of Manufacturers of Chilled Car Wheels, and his laboratory assistant, Irene Johnson, one of the few lady metallurgists in the country.

Chapter Vice-Chairman A. S. Klopf, Hansell-Elcock Co., then introduced the feature speaker of the evening, H. W. Dietert, Harry W. Dietert Co., Detroit. Mr. Dietert presented his excellent film record on "Mold and Core Surface Behavior at Pouring Temperature," and after each film shown answered numerous questions from the floor. Great interest was shown in the subject.

During the evening tribute was paid to one of the old-time members of the Chicago foundrymen's group, Oscar C. Olson of S. Obermayer Co., who died recently. Secretary Frank Wartgow, American Steel Foundries, was instructed to express to Mr. Olson's family the Chapter's sympathy.

Fred Sefing Addresses Western New York

By J. Ralph Turner

WHEN the Western New York group held its opening meeting at Hotel Touraine, Buffalo, October 1, Chairman F. E. Bates, Worthington Pump & Machinery Corp., Buffalo, introduced the new chapter officers and directors to the 120 members and guests who were assembled.

Samuel Appleby, Buffalo Foundry & Machine So., Buffalo, was then presented as technical chairman of the evening, and he introduced the principal speaker, F. G. Sefing, International Nickel Co., New York.

In his subject, "A Study of Molding Methods for Sound Castings," Mr. Sefing emphasized that a sound casting is more important than the metal that is poured into it. He also said that castings free from defects are dependable in service, more machinable, and can command higher prices, resulting in more profit for the foundry. The importance of gate design was stressed since, the speaker declared, clean metal can be assured by various types of gates.

Other phases of the address included pouring, controlled directional solidification, risers, the use of chills and venting. A lively discussion period followed the talk.

Wisconsin Opens Year With Round Tables

By Darold W. Thiem

THE third fall sectional meeting of the Wisconsin Chapter was called to order by Chapter President George K. Dreher, Ampco Metal, Inc., Milwaukee, on September 10 at the Schroeder Hotel, Milwaukee. After a short talk, Mr. Dreher presented the speakers of the different sections and the groups went into session.

The chairman of the gray iron section, F. L. Waldenmeyer, Lakeside Malleable Castings Co., Racine, Wis., introduced the speaker of the evening, Charles Burgess, Union Carbide and Carbon Co., Niagara Falls. Mr. Burgess spoke about the "Latest Development of Ladle Addition," emphasizing, as his main point, the balancing and graphitizing elements which give lasting uniforming to gray iron.

The steel section, under the chairmanship of Charles Fuerst, Falk Corp., Milwaukee, was first addressed by Prof. G. J. Barker, University of Wisconsin, Madi-

son, who talked on "Furnaces and Ladle Refractories." This was followed by a discussion led by C. E. Bales, Ironton Fire Brick Co., Ironton, Ohio.

Harvey Osborn, chairman of the malleable section, introduced J. H. Lansing, Malleable Founders' Society, Cleveland. In his talk Mr. Lansing dealt with the important role that iron castings are now playing in the war effort.

The non-ferrous section, under the leadership of Chairman B. D. Claffey, General Malleable Corp., Waukesha, Wis., heard a talk on the production of cores for aluminum and magnesium castings, given by J. A. Gitzen, Delta Oil Products Co., Milwaukee.

George Smitka, Ampco Metal, Inc., Milwaukee, chairman of the pattern section, introduced Walter Schmidt, who spoke on models and their relation to the pattern shop.

Eastern Canada and Newfoundland Begins Season with 202 Members

By A. E. Cartwright

E. N. DELAHUNT, new chairman of the Eastern Canada and Newfoundland Chapter, conducted his first general group meeting on September 17, when the opening get-together of the 1943-44 season was held at the Mount Royal Hotel, Montreal.

About one hundred members and guests were present to applaud the efforts of the chapter in increasing the membership list to a total of 202 members at the first roll call, with excellent prospects for additional expansion.

The financial status of the chapter was reviewed, and it was disclosed that the coffers held a substantial cash balance, after allowance for purchase of War Bonds.

A schedule of events, emphasizing the practical aspects of foundry problems, was submitted by the program committee and approved. It is expected that the current season will provide meetings of interest to all members.

Alexander Douglas, Peacock Bros., Ltd., Montreal, was the principal speaker of the evening. His subject — "Why All the Fuss?" — gave him an opportunity to draw upon his 30 years of experience in the manufacture and maintenance of marine equipment, much of which has been concerned with British naval work.

Mr. Douglas stressed the importance of thorough conformance with specifications, pointing out that the Admiralty specifications are drawn on a basis of long and costly experience and are not, as frequently supposed, designed to deliberately handicap the manufacturer.

It was his opinion that the

(Photos courtesy Clyde Thomas, Whiting Corp.)

The annual outing at the Lincolnshire Country Club, August 21, gave members of the Chicago Chapter a well earned day of rest and relaxation.

standard Admiralty gun metal, 88-10-2, is superior for marine equipment to any of the alternatives and substitutes now being used and that, when tin again becomes sufficiently available, the original composition will be preferred by marine engineers. Mr. Douglas said that the all-around performance reliability of 88-10-2 gun metal has not been equaled to date.

While admitting the feasibility of salvaging some defective castings by good burning-on or welding practice, Mr. Douglas emphasized that the shocks and strains imposed upon marine equpiment are extremely severe due to concussions caused by depth charges and bombing. He said that repairs should not be permitted where any risk of failure, resulting from the defect or its repair, might conceivably cause collapse, and he particularly condemned the practice of welding for repair, without adequate subsequent normalizing treatment.

Mr. Douglas called upon the foundrymen to be thoroughly concientious regarding the quality of their castings, especially where the lives of our fighting men depend to a great extent upon the soundness of the products.

Special Meeting Opens Southern California's Fall Program

By Blaine Bender

ON September 25 two hundred members of the Southern California Chapter availed themselves of the invitation extended by the officials of the Fontana Steel Plant of the Kaiser Co., Inc.

The guests were taken on a complete tour of the steel plant which is the only one of its kind on the West Coast. Among the many units in operation were 90 coke ovens, a sintering plant, four 185-ton open hearths, and a 110-in. plate mill. The foundrymen evinced keen interest in the transition from raw materials to finished products.

After dinner in the modern cafeteria, Chapter President W. F. Haggman, Foundry Specialties Co., Huntington Park, Calif., introduced several key executives of the Kaiser Company. Rudy Stuler, assistant to the plant manager, Thomas Hart, superintendent of coke ovens, and W. A. Saylor, superintendent of iron and steel production, all of the Kaiser organization, gave talks on the plant history and operations in their respective departments.

October Meeting

While the visit to the Kaiser plant brought the chapter members together in September, the season opened officially with the regular monthly meeting, October 8, at which three speakers were featured.

W. D. Emmett, Los Angeles Steel Casting Co., Los Angeles, selected as his subject "Heading and Gating of Steel Castings"; J. B. Morey, International Nickel Co., Inc., Los Angeles, talked on "Heavy and Medium Gray Iron War Castings"; and H. E. McGowan, H. E. McGowan Co., Los Angeles, delivered an address on "Brass Alloy in the Foundry and Proper Test Bar Control." Round table discussions, led by the different speakers, completed the program.

Texans To Hold 2nd Meeting in November

CLOSELY following up the original meeting of Texas foundrymen in Houston, October 29, the newly organized Texas Foundry Group will meet again in Houston during the latter part of November, it has been announced. While the exact date of the meeting has not yet been definitely set, H. W. Dietert, Harry W. Dietert Co., Detroit, has accepted an invitation to be the guest speaker.

Further details of this second meeting are to be announced by the local committee in charge of the arrangements, headed by F. M. Wittlinger, Texas Electric Steel Co., as chairman. J. O. Klein, Texas Foundries Inc., is serving as vice-chairman, and H. L. Wren, Barada & Page, as secretary.

The 1934-44 Gavel Sounds for Chesapeake

By George T. Kuhn

"NATIONAL Officers Night" marked the Chesapeake Chapter's opening meeting at the Engineers Club in Baltimore, Md., September 24th.

Presiding for the first time was the newly elected chapter chairman, R. T. Covington, American Hammered Piston Ring Div., Koppers Co., Baltimore. Chairman Covington, who has been actively associated with the group's development since its formation, three years ago, called upon both E. W. Horlebein, Gibson & Kirk Co., Baltimore, as the chapter's first chairman, and L. H. Denton, secretary-treasurer, to review the history of Chesapeake.

Robert E. Kennedy, National Secretary of A.F.A., Chicago, braved the discomforts of wartime traveling to be present at the occasion. After briefly discussing the work of the national office, Mr. Kennedy introduced the National A.F.A. President, Lee Wilson, Reading Steel Casting Div., American Chain & Cable Co., Inc., Reading, Pa.

Upon the occasion, his first official meeting with the Chesapeake group, President Wilson received a most cordial reception. In addressing the meeting, Mr. Wilson talked on the value of apprentice training, formanship training, and the future of the industry. He also gave a new insight into the relationship between A.F.A. and the industry's trade association, indicating the spirit of geniality and cooperation which exists between the two organizations.

Another chapter guest and speaker was Harry Reitinger, Bethlehem Steel Co., Bethlehem, Pa., past chairman of the Philadelphia Chapter and a present National Director of A.F.A. Mr.

Reitinger, in addressing the group, spoke as a member of the Chapter Contacts Committee of the national body. After his talk, the members signified their interest in renewing the regional meetings between the New York, Philadelphia and Baltimore Chapters in the fall of 1944.

Monthly Meetings Begin For Cincinnati Chapter

By M. F. Milligan

SEVENTY-FIVE members and guests were present at the Cincinnati Club, October 11, when the Cincinnati Chapter held its regular monthly meeting. Vice-Chairman Wm. A. Rengering, Cincinnati Milling Machine Co., Oakley, Cincinnati, presided.

The leading speaker at the occasion was Jas. A. Murphy, Jas. A. Murphy Co., Hamilton, Ohio. His subject, "Compressed Air—Its Troubles and Remedies," included a general consideration of air, water vapor and dewpoint.

Pointing out the various difficulties encountered by water-vapor in compressed air lines, Mr. Murphy discussed methods of eliminating these troubles, placing special emphasis on the proper design and layout of piping systems. A discussion period followed the talk.

Twin City Discusses Foundry in Wartime

By Alexis Caswell

APPROXIMATELY 110 members and guests of the Twin City Chapter of A.F.A. met at the Midway Club, St. Paul, Minn., on September 28, for their regular monthly meeting, which was given over to an important discussion of foundry wartime problems. Chapter Vice-Chairman Clifford Anderson, Crown Iron Works Co., Minneapolis, presided, and introduced government officials, following whose talks an open panel discussion featured the evening.

Maj. Wm. Moiselle, Labor Officer, Seventh Service Command, U. S. Army, Minneapolis; Maj. M. C. Walter, Assistant to the State Director of Selective Service, Minneapolis; Frank Rarig, Regional Director of the War Manpower Commission, Minneapolis, and Mr. Rarig's associate, H. Rothschild, all presented pertinent information dealing with phases of the foundry employment problem. Numerous questions were asked by the foundrymen who were present.

As a result of the discussion, it was decided that the Chapter would appoint a committee which would work more closely with the local U. S. Employment Service in an effort to expedite the hiring of foundry workers. Another function of this committee will be making efforts to combat erroneous publicity concerning the foundry as a place to work. It is hoped that through the work of this committee the problem of replacing lost manpower in the Twin City foundry area may be somewhat relieved.

Reporters on Chapter Activities

Officers and representatives of A.F.A. chapters and other foundry groups who sent in the reports of local activities, shown in the *Chapter Activities News* section, are identified below:

Chesapeake—Geo. T. Kuhn, Gibson & Kirk Co., Baltimore, Md.; Chapter Reporter.

Cincinnati—Martin F. Milligan, The Lunkenheimer Co., Cincinnati; Chapter Secretary.

Eastern Canada & Newfoundland—A. E. Cartwright, Robert Mitchell Co., Ltd., St. Laurent, Que.; Chapter Director.

Southern California—Blaine Bender, Advance Aluminum & Brass Co., Los Angeles; Chapter Publicity Secretary.

Twin City—Alexis Caswell, Manufacturers' Association of Minneapolis, Inc., Minneapolis; Chapter Secretary-Treasurer.

Western New York—J. Ralph Turner, Queen City Sand & Supply Co., Buffalo; Chapter Secretary.

Wisconsin—Darold W. Thiem, Pollard Oil Products Co., Milwaukee; Chapter Publicity Chairman.

Michiana Holds 1st Meeting in Michigan

THE Michiana Chapter, for its first meeting of the season, departed from its regular policy of holding meetings at South Bend, Ind., and held its first meeting in the St. Joseph-Benton Harbor district, October 5, at the Hotel Whitcome, St. Joseph, Mich.

Success of the meeting is shown by the attendance of over 150 foundrymen, more than at any meeting held during the previous season. The excellent facilities provided by the hotel, the fine food prepared for and enjoyed by the foundrymen, plus an exceptionally fine speaker on a timely subject, all contributed to a worth-while event.

Under the leadership of Joe Drain, Oliver Farm Equipment Co., South Bend, Ind., and Chapter Chairman, the meeting was opened, and his comments on the excellent attendance and the possibility of holding other meetings in that area brought applause. He presented the delegation from the Benton Harbor Malleable Industry, the largest group attending the meeting from any one shop.

Speaker of the evening was M. D. Johnson, Chief Inspector, Caterpillar Tractor Co., Peoria, Ill., who gave an excellent talk on "Quality Control." Throughout his discussion, he illustrated his various points by means of lantern slides, showing excellent, passable ond poor castings, due to various causes. He also outlined some of the inspection techniques employed at his plant. In discussing the function of inspector, the speaker stated that an inspector was a critic of quality. In general, the more critical a man may be, the better inspector he makes.

After the meeting, those present enjoyed entertainment consisting of sleight-of-hand performance.

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, N. Y.

Aluminum

CASTING METHODS. *(See Non-Ferrous Castings.)*

CORE MOLDS. *"Aluminum Castings Poured in Cores,"* William G. Gude, *The Foundry,* vol. 71, No. 9, September, 1943. pp. 96-99, 178. The pouring of cylinder head castings in cores, rather than in green sand molds, has been tried by the Acme Pattern & Tool Co., Inc., Dayton, Ohio, and has been found to reduce the amount of metal needed to pour each cylinder head by 65 per cent, as well as cutting the size of an assembled mold nearly 50 per cent. These savings in metal and mold size enable the foundry to pour nearly two and a half times the number of castings, using the same amount of metal and floor space. The foundry also produces crankcases in molds made partly of green sand and partly of cores. The castings are made with large risers to insure adequate feeding, and are poured with a British cylinder head alloy. Nitrogen gas is used for fluxing. Composition and temperature of each heat are carefully controlled. An identification number is stamped on a riser of each casting before it is removed from the core. Later on, the number is transferred to the casting itself. Test bars are poured from each heat. The removal of risers and gates on cylinder head and crankcase castings involves considerable work. Risers on crankcase castings are removed by electric welding, using reversed polarity. Any excess metal remaining at the base of the risers is chipped away. Risers on the cylinder head castings are removed by drilling a hole slightly smaller than the diameter of the riser through the riser, and then chipping away the thin remaining shell. Castings are heat treated and stress relieved following removal of gates and risers.

PRODUCTION METHOD RECORDS. *"A Method of Correlating Foundry Practice and Quality of Light Alloy Castings,* H. G. Warrington, *Foundry Trade Journal,* vol. 70, No. 1406, July 29, 1943, pp. 255-259, and vol. 70, No. 1407, August 5, 1943, pp. 283-287. This paper, which was presented before the Fortieth Annual Conference of the Institute of British Foundrymen, describes the routine method of examination and recording used by High Duty Alloys, Ltd., to get the production of a light metal casting under way in the shortest possible time and with the least possible difficulty. This record serves not only to determine the most suitable method of producing a part, but also the effect of method changes made after production is under way. If, for any reason, production is stopped for a considerable length of time and then resumed, or if production is undertaken in a different foundry, the method for producing a satisfactory casting is completely and clearly described. Ordinarily the first casting of a kind produced by a given method is used for a dimensional check, and the second casting is used for subsequent examination. A complete examination and record previous to production release would include (1) a dimensional check; (2) photograph showing the runners and riser; (3) record of dimensions of runners and risers; (4) details of molding materials, melting procedures, and pouring temperature; (5) record of visual appearance of the casting; (6) radiological examination; (7) heat treatment (if required); (8) fracture examination; (9) macro and micro examination of typical sections, face polished and etched; (10) tensile tests from representative sections, if the casting is stressed; (11) Brinell hardness survey (piston castings); (12) pressure test, preferably after machining; and (13) analysis check for composition variations. Sometimes, in regular practice, experience permits the omission of some of these procedures before production release. The article reproduces a form used to report the results of pre-production examinations, and gives the actual record of report on several light metal castings.

Bombs

CAST IRON. *(See Cast Iron.)*

Brass and Bronze

CASTING METHODS. *(See Non-Ferrous Castings.)*

MANGANESE BRONZE. *"Controls Manganese Bronze Melting,"* N. K. B. Patch, *The Foundry,* vol. 71, No. 9, September 1943, pp. 106, 153. In melting manganese bronze, it is important that the composition be kept within the desired limits. Ordinarily ingot metal of controlled analysis is used for the charge. However, during melting, the zinc volatilizes and must be replaced before pouring. Chemical analysis to determine whether the zinc has been replaced would take too much time. Therefore, a cruder but quick and valuable test for estimating the zinc content is a fracture test performed on a thin, flat bar cast in an iron mold. Experience in observing the fracture of a particular analysis of manganese bronze will enable the observer to determine whether the zinc content is sufficiently high. However, different analyses of manganese bronze will have fractures of different appearance at the desired zinc contents, so the observer should know what alloy he is working with and be familiar with the characteristic fractures of that alloy.

TIN-FREE BRONZES. *"Copper-Antimony-Nickel Gear Alloy,"* report by the Institute of British Foundrymen Non-Ferrous Technical Committee, *The Metal Industry* (London), vol. 63, No. 4, July 23, 1943, pp. 50-52; vol. 68, No. 5, July 30, 1943, pp. 74-76; vol. 63, No. 6, August 6, 1943, pp. 86-89. The report, which was recently presented at the Annual General Meeting of the Institute of British Foundrymen, consists of papers by men from various companies, describing the characteristics and properties of copper-antimony-nickel alloys. The subcommittee recommends that further tests of the alloy be made, and until then they do not recommend the alloy as a general substitute for tin bronze. However, it may be quite suitable for some types of gears and bearing surfaces.

British Research

CAST IRON. *(See Cast Iron.)*

Cast Iron

BRITISH RESEARCH. *"British Open New Laboratory,"* Vincent Delport, *The Foundry,* vol. 71, No. 8, August, 1943, pp. 102-103, 156-158. The British Cast Iron Research Association, which has for its objectives doing research work on fundamental subjects of interest to the foundry industry, investigating and replying to inquries of its members on specific subjects, and supplying library and information bureau services, is now housed in a new building. The new quarters include the administrative offices; library and information bureau; development department; microscopic, physical metallurgy, sands and refractories, chemical, and vitreous enameling laboratories; a machine shop; and an experimental foundry. The author describes fully the various furnaces housed in the experimental foundry.

HIGH PHOSPHORUS IRON. *"British Use Gray Cast Iron For Trench Mortar Bombs," The Foundry,* vol. 71, No. 9, September, 1943, pp. 107-108, 183-187. This paper, presented at the annual conference of the Institute of British Foundrymen held in London, June 26, is a report of the Cast Iron Subcommittee of the Technical Committee of the Institute, covering the changes in supplies of raw materials. It describes how alloys with high phosphorus contents may be used

to produce sound castings of certain types, thus compensating for the decreased supply of low phosphorus raw materials and permitting their use for more critical castings. For an example, the ways in which a trench mortar bomb body may be cast in green sand and centrifugally are described. Silicon control as a means of controlling fluidity in low-phosphorus irons and the means of introducing silicon to the metal are also described.

Casting

CASTING TECHNIQUES. *(See Non-Ferrous.)*

Centrifugal Casting

NON-FERROUS CASTING. *(See Non-Ferrous Casting.)*

CYLINDER BARRELS. *"Ford Casts Cylinder Barrels Centrifugally," The Foundry,* vol. 71, No. 8, August, 1943, pp. 98-99, 180. Ford has adopted the centrifugal casting process to the production of alloy steel cylinder barrels for Pratt & Whitney aircraft engines. The change from forging to centrifugal casting of the cylinder barrels resulted in a saving of 35 pounds of alloy steel per barrel, 70 per cent of equipment costs, and 15 minutes of machining time on each barrel. The most difficult job in connection with the casting process was convincing Pratt & Whitney that cast barrels would be satisfactory. Actually, when the barrels were tested, they proved to have even greater strength than forged barrels.

Converter

MANGANESE STEEL. *(See Steel.)*

Cores

CORE MOLDS. *(See Aluminum.)*

Die Casting

ZINC-BASE ALLOYS. *"Zinc-Aluminum-Copper Casting Alloys,"* A. Burkhardt, E. Gwinner, K. Lohberg, and E. Schmidt, *The Metal Industry* (London), vol. 63, No. 10, September 3, 1943, pp. 146-149. This article, which is a translation of a paper originally published in *Z. Metallkunde,* gives a detailed description of zinc-aluminum-copper alloys. The description includes compositions and phases, illustrated by a constitutional diagram; casting properties; mechanical properties; ageing and dimensional stability; and intercrystalline corrosion. Results of tests performed on alloys of various compositions indicate that for best strength properties and resistance to intercrystalline corrosion, compositions approaching the ternary eutectic alloy are the most desirable. On the other hand, casting properties and dimensional stability became poorer as the euctectic composition was approached. The pendulum bend strength was best at intermediate values between the binary zinc-aluminum alloy and the ternary eutectic. Based on these observations, a desirable alloy would be 1.2-1.6 per cent Cu, 5.7-5.9 per cent Al.

Fatigue Tests

OVERSTRESSING AND UNDERSTRESSING. *"The Effect of Overstressing and Understressing in Fatigue,"* J. B. Kommers, A.S.T.M. 1943 Preprint 43, 14 p. Overstressing tests were carried out on smooth and square-notched specimens of annealed ingot iron and S.A.E. 1030 steel, and on smooth specimens of cold-drawn ingot iron. Damage curves are drawn for these cases, showing how the percentage of damage varies with the number of cycles of overstress. Understressing tests were carried out on smooth specimens of annealed ingot iron. It is shown how the endurance limit is increased with increase of the number of cycles of understress. It is also shown how understress plus subsequent "coaxing" may further increase the endurance limit. While understressing plus coaxing may increase the endurance limit from 25 to 30 per cent, it is shown that such stressing may increase the endurance life at higher stresses as much as 23,000 per cent.

Gray Iron

SPECTROGRAPHIC ANALYSIS. *"The Spectrographic Analysis of Cast Iron,"* F. B. Ling, J. McPheat, and J. Arnott, *Foundry Trade Journal,* vol. 70, No. 1405, July 22, 1943, pp. 233-238, 240. The authors briefly explain the principles of spectrographic analysis and then describe the methods they used to establish standards to enable them to use the spectrograph for both qualitative and quantitative analysis of cast iron. They also summarize the advantages and limitations of spectrographic analysis.

Ingot Iron

FATIGUE. *(See Fatigue Tests.)*

Ingots

DIRECT COOLING. *(See Non-Ferrous Ingots.)*

Magnesium

AIRCRAFT CASTING PRODUCTION. *"Chevrolet Casts Magnesium," The Foundry,* vol. 71, No. 8, August, 1943, pp. 90-94, 179. How a magnesium foundry was set up and operated in conjunction with Chevrolet's large gray iron foundry is described in this article. Emphasis is placed on the greater care and control necessary in casting magnesium than in casting gray cast iron.

Manganese Bronze

MELTING CONTROL. *(See Brass and Bronze.)*

Melting Practice

MANGANESE BRONZE. *(See Brass and Bronze.)*

Non-Ferrous Castings

CASTING METHODS. *"Which Form of Non-Ferrous Casting?"* Herbert Chase, *Metals and Alloys,* vol. 18, No. 3, September, 1943, pp. 496-502. After a designer has chosen a non-ferrous alloy for a part and has decided that the part shall be a casting, he must then decide by which method the part shall be cast. His decision will be influenced by number of castings, cost of the rough casting, cost of machining, cost of tooling, size and shape of casting, type and sizes of cores, kind of metal, section thicknesses, tolerances, and available facilities. For sand casting, the advantages of low pattern cost, rapid production, and ability to pour alloys at high temperatures are off-set by the need for a new mold for each casting, separate making and setting of cores, often high machining costs, granular surfaces, and difficulty in holding close dimensional limits. Plaster casting permits closer control of dimensions, sharper outlines, and smoother surfaces. However, metal patterns are necessary for production runs, mold cost is apt to be higher than for sand molds, and the plaster has a lower thermal conductivity than sand. Metal molds include premanent molds and die casting molds. Metal mold castings have close tolerances, smooth surfaces, and permit the production of large numbers of castings in a single mold. Metal mold castings have a harder skin and are softer on the inside. They may have porosity confined to thick sections unless carefully designed. Alloys poured at high temperatures are harder on metal molds than alloys poured at low temperatures. Die castings may be made in gooseneck machines, plunger machines, or cold chamber machines. Centrifugal casting is much used for copper-base and bearing alloys. Castings are dense and relatively free of dross. The most frequent type of centrifugal casting is symmetrical about the axis of rotation, but other shaped parts may also be cast centrifugally. The author includes in the article two tables showing the tolerances on various types of metal-mold non-ferrous castings and the relative design characteristics of different non-ferrous casting methods.

Non-Ferrous Ingots

DIRECT COOLING. *"Direct Cooling Process of Casting Metal Ingots,"* H. F. James, *The Metal Industry,* vol. 63, No. 11, September 10, 1943, p. 169. The author very briefly describes a method of ingot pouring in a mold with a removable bottom, through which the partially solidified ingot is slowly lowered into cooling water while the pouring level of the ingot remains at the same height. This method is described in British Patent Specification No. 492, 216. An improvement over this method, in which water is sprayed on the solidified part of the ingot, is described in British Provisional Patent Specification No. 61177.

Open-Hearth Furnace

BASIC LININGS. *(See Refractories.)*

Plaster of Paris Mold Castings

NON-FERROUS. *(See Non-Ferrous Casting.)*

Refractories

BASIC OPEN-HEARTH. *"The Maintenance of the Furnace Linings in Large Basic Open-Hearth Tilting Furnaces by the Use of Chrome Ore, Magnesite and Serpentine,"* A. Jackson, *Advance Copy, The Iron and Steel Institute,* August, 1943, 3 pages. In a recent paper, "The Linings of Large Basic Open-Hearth Tilting Furnaces" *(Journal of The Iron and Steel Institute,* 1942, No. II, pp. 9P-16P), developments in economizing in the use of magnesite bricks for large open-hearth tilting furnaces were described. This included discussion of the

usefulness of stabilized dolomite bricks, the importance of the quality of "Basic," and reduction in the number of chrome-magnesite bricks used in front walls. The information then given is now supplemented by a discussion of the use of parging pastes containing chrome ore and serpentine, with the object of reducing still further the consumption of magnesite. The possibility of reducing the consumption of chorme ore is also considered. Results obtained with various mixtures of magnesite, chrome ore, and serpentine are described.

Salvage

POROUS CASTINGS. *"Reclamation of Porous Castings," The Metal Industry* (London), vol. 63, No. 9, August 27, 1943, p. 136. Many porous castings may be salvaged by a method evolved by Commercial Structures, Ltd., and Bakelite, Ltd. The method consists of impregnating the pores of the casting with a plastic material under pressure, followed by baking to convert the plastic to a highly resistant filling which effectively seals the pores of the casting. Use of this sealing process has been approved for use by the British Naval Authorities and the Ministries of Aircraft Production and Supply.

Sand

FACINGS. *"Foundry Facings,"* E. S. Glauch, *Pig Iron Rough Notes,* Summer, 1943, pp. 29-32. Foundry facings include sea coal facing, graphite facing, mineral facing, and blacking. Sea coal is mixed with the molding sand, whereas the other facings are generally applied to the mold surface. Blackings are applied in the form of a syrupy mixture. Sea coal facing probably burns when in contact with hot metal, leaving voids and thus making the sand more open. Graphite presents a smoother surface over which the metal must flow. If the sand is too dry for the graphite to adhere to it, the graphite will be pushed ahead of the metal and will fail to improve the surface. Mineral facings include talc, soapstone, silica, and cement. These are generally dusted on the mold without slicking. Blackings vary considerably in composition.

PROBLEMS. *"Sand Problems in the Foundry,"* Earl E. Woodliff, *Pig Iron Rough Notes,* Summer, 1943, pp. 15-19. Workability is a sand characteristic very important to the molder. A number of properties must be controlled to maintain a suitable workability. Sand must be clean, and must have the proper bond strength and moisture content. Care should be taken to maintain the sand. Excessive fines should not be allowed to accumulate, and bond material should be kept up. Rat tails, metal penetration, and scabs are defects which may be remedied by changes in the sand. Core sands, as well as molding sands, often present problems. The most common defects traceable to core sands are core scabs, early collapsibility, and hot strains. Core scabs may result from an incompletely baked core or absorption of moisture after baking. Early collapsibility can be improved by changing the oil content of the core. Hot strains indicate too high a hot strength.

Spectrographic Analysis

GRAY CAST IRON. *(See Gray Cast Iron.)*

Steel

AUSTENITE-PEARLITE REACTION. *"Effect of Inhomogeneity in Austenite on the Rate of the Austenite-Pearlite Reaction in Plain Carbon Steels,"* George A. Roberts and Robert F. Mehl, American Institute of Mining and Metallurgical Engineers Technical Publication No. 1568, *Metals Technology,* vol. 10, No. 4, June, 1943, 16 pp. Austenite is not homogeneous when it first forms from aggregates of cementite and ferrite. The inhomogeneity effects the austenite-pearlite reaction. The authors of this paper studied the effects of inhomogeneity on the austenite-pearlite reaction, developed methods for determining the austenitizing cycle necessary to improve homogeneity, and considered the effects of inhomogeneity on hardenability. They found that large quantities of undissolved carbide increased the rate of austenite-pearlite reaction. This effect was more marked at high temperatures, where carbon concentration gradients also increased the rate of the austenite-pearlite reaction. The presence of undissolved carbide reduces hardenability. Carbon concentration gradients had little effect upon hardenability. By calculating and allowing for the true effect of austenite grain size on the reaction rate, a sensitive test for austenite homogeneity was devised. This provided homogenization schedules for obtaining equivalent homogenization in steels of different homogenizing characteristics. The use of correct austenitizing times should eliminate the effects of minor inhomogeneities at temperatures near the Ae_1 and the knee of the S curve, and on hardenability.

CYLINDER BARRELS. *(See Centrifugal Casting.)*

FATIGUE. *(See Fatigue Tests.)*

INGOTS. *"The Origin, Definition and Prevention of Scabs,"* T. J. Woods, Technical Publication No. 1616, *Metals Technology,* vol. 10, No. 6, September, 1943, 8 pages. The author made a study of ingots of killed and semi-killed steels to determine the causes and ways of preventing scabs on the rolled product. He concluded that scabs are portions of a shell which is present on normally poured heats, or are parts of a veneer which results from improper pouring practice. Scabs may be prevented by using a nozzle of sufficient size to permit the molten metal to overtake the shell before it becomes too cold and oxidizes, and also by avoiding stop pours, particularly near the bottom of ingots.

MANGANESE STEEL. *"Production of Manganese Steel Castings from the Tropenas Converter,"* L. W. Bolton and J. Hill, *Iron and Steel,* vol. 16, No. 14, September, 1943, pp. 537-542, 555. Austentic manganese steel for the production of light castings may be manufactured by either of two methods: the basic electric furnace of a direct arc type may be used to remelt steel scrap and ferro-manganese, or a dead mild steel may be produced by means of the cupola and converter, to which is added the requisite amount of molten ferro-manganese. With the first method an unlimited amount of manganese steel scrap can be used. In the converter method, however, the amount of manganese steel return scrap which can be used is limited. The quality of steels produced by either method is nearly the same. By proper scheduling of all foundry operations, it is possible to produce austentic manganese steel by the converter method for continuous casting without the use of a holding furnace. Briefly, the method consists of transferring molten metal from a cupola to a side-blown converter, transferring the proper amount of molten ferro-manganese from a cupolette to a pouring ladle, teeming molten steel from the converter into the pouring ladle, and then transferring the pouring ladle to the pouring station in the foundry. All melting conditions must be carefully controlled in order to have enough steel available at exactly the right time. In order to maintain a constant blowing time, it is necessary to control blast volume and pressure, metal temperature, blowing angle, condition and temperature of the converter lining, and composition of the metal. Variations in silicon content caused variation in blowing time. Manganese, in amounts over 1 per cent, seems to have little effect on the time but high manganese produces extremely fluid slag. Likewise carbon content makes little difference, although one would expect higher carbon contents to increase the time of the blow. A silicon content of 1.2 to 1.4 is used. Manganese is kept between 0.8 and 1.0 per cent. No attempt is made to control the carbon content. Both a large and small converter are used. The lining of the small converter is not patched because of the tendency of patches to come off in the metal. However, the large converter is carefully patched with gannister after each shift. Usual cupola practice is observed. In melting the ferro-manganese in the cupolette, care must be taken to have the metal hot enough, for its life is short. Simply pouring the molten steel into the molten ferro-manganese is sufficient to mix it well.

TENSILE PROPERTIES. *"Some Tensile Shock Properties of Carbon Steels,"* F. V. Warnock and J. B. Brennan, *Iron and Steel Institute Advance Copy,* July, 1943, 20 pp. Previous work carried out by Smith and Warnock on the tensile shock properties of Lowmoor iron formed the basis of a similar investigation embracing a family of carbon steels and carried out on the same testing machine. The residual energy after fracture was accurately measured by a device designed for that purpose. The results of static, single-shock and multi-shock tests are compared and show that both the single-shock energy and the ratio of the static energy to the single-shock energy are dependent on the carbon content. The elongation produced by single-shock tests differs in many cases from that obtained by static methods, but the reduction of area remains substantially unaffected by the method of testing. A limiting range of shock energy, dependent on the carbon content, was indicated. Maximum values of elongation and reduction of area were observed in the multi-shock tests. An increase in the number of shocks for rupture caused a rapid diminution in the values of these quantities.

TRIPLEXING. *"Pours Triplex Steel on Conveyor,"* A. H. Allen, *The Foundry,* vol. 71, No. 9, September, 1943, pp. 94-95, 188-189. The author describes the new steel foundry of the Rouge plant of Ford Motor Co., Dearborn, Mich. This foundry produces carbon steel and armor steel castings for ord-

nance and aircraft equipment. Outstanding features of the foundry are the use of triplexing and the completely conveyorized handling of all materials, including bringing the molds to the metal. Metal is melted in a cupola, desulphurized in the ladle, blown in a bessemer converter, and held in an electric furnace. Alloy additions are made in the ladle prior to holding in the electric furnace.

TOOL STEELS. *"Wartime Tool Steels,"* H. B. Chambers, *Canadian Metals and Metallurgical Industries,* vol. 6, No. 6, pp. 24-26, 33. Tool steels are basically the same as they were in pre-war time. Certain factors have a direct bearing on the performance of tool steels, and users have control over most of these factors. Tool steels are strategic alloys and must be used wisely. It has been found that for wearing surfaces of cutting tools, dies, and gauges, better performance is obtained with finer finish. Fine finish may be further improved with chrome plating or nitriding. Since the alloying elements in tool steels are now scarce, they must be used more conservatively than in peace times. Most manufacturers have had to use some molybdenum high speed steel in place of tungsten types. However, no trouble should be encountered in substituting, provided the molybdenum steel is hardened from a lower temperature. Heat treatment is of vital importance in the use of tool steels, and must be done properly. Both good equipment and good hardening technique are necessary to maintain consistent production.

Tensile Shock Properties

CARBON STEELS. *(See Steel.)*

Testing

FATIGUE. *(See Fatigue Tests.)*

Tin Conservation

TIN-FREE BRONZES. *(See Brass and Bronze.)*

Training

WOMEN WORKERS. *"Women Who Work for Victory,"* W. Gerard Tuttle, *Mechanical Engineering,* vol. 65, No. 9, September, 1943, pp. 657-660. Consolidated Vultee Aircraft Corp. now employs large numbers of women to do the work which formerly was done by men. They have found that in order to use women effectively, certain adjustments must be made in supervisory methods, in tool designs, and in work routines, in order to accommodate the special mental, emotional, and physical attributes of women. Differences in the physical proportions of men and women have necessitated changing the height and width of work benches. Not only are women smaller than men, but a lesser proportion of their body is muscle. Consequently they have less strength and need more frequent rest pauses than do men. Women are faster and more accurate in light, rhythmical movements, but are slower on operations which require decisions to be made. The alignment of a woman's knee joints and the inclination of the thigh bones makes it more difficult for a woman to maintain her balance. Therefore, special care should be used when placing women on jobs which require climbing or moving around on high platforms. A similar alignment of the elbow joints makes it more difficult for a woman to use a rotary arm movement in operating tools such as screw drivers. Women are more emotionally volatile and more sensitive to environmental influences. Foremen must train and direct women in a different manner than when they are supervising men. Insofar as possible, all jobs should be simplified. Tools should also be simplified and modified to make up for a woman's lesser strength. Foremen are given special classes in the instruction and training of women, and women are given classes to train them for their various jobs. A Women's Counselling Service, originally established as a disciplinary measure, now serves to discover and seek corrective action for any situation that interferes with the effectiveness of women employees, whether that situation arises from condition in the plant, in the community, or in the home.

Triplexing

STEEL. *(See Steel.)*

Zinc-base Alloys

CASTING METHODS. *(See Non-Ferrous Casting.)*

Zinc-Base Alloys

ZINC-ALUMINUM-COPPER ALLOYS. *(See Die Casting.)*

Schedule of November Chapter Meetings

November 1

Metropolitan
NATIONAL OFFICERS' NIGHT

✦

Central Indiana
Washington Hotel, Indianapolis
R. A. BONNELL
"Inspection of Non-Magnetic and Magnetic Materials"

✦

Chicago
Chicago Bar Assn., Chicago
ROUND TABLE MEETINGS
Gray Iron
"Heat Treatment of Castings"
Steel
"Acid Electric Steel"
Non-Ferrous
"Rigging Patterns for Production"

✦ ✦

November 2

Michiana
La Salle Hotel, South Bend, Ind.
A. W. GREGG
Whiting Corp.
"Cup Chargers"
W. B. GEORGE
R. Lavin & Sons, Inc.
"Non-Ferrous"

✦ ✦

November 5

Western New York
Hotel Touraine, Buffalo

November 8

Cincinnati
Cincinnati Club, Cincinnati
CECIL BALES
Ironton Fire Brick Co.
"New Developments in Refractories"
M. H. BERNS
Electro Refractories & Alloys Corp.
"Refractories for Non-Ferrous Foundries"

✦ ✦

November 11

Northeastern Ohio
Cleveland Club, Cleveland

✦

November 12

Central New York
Onondaga Hotel, Syracuse, N. Y.
J. S. VANICK
International Nickel Co.
"Heat Treatment of Ferrous Cast Metals"

✦

Northern California
Leamington Hotel, Oakland, Calif.

✦ ✦

November 15

Quad City
Hotel Ft. Armstrong,
Rock Island, Ill.

✦ ✦

November 19

Eastern Canada and New Foundland
Mt. Royal Hotel, Montreal
L. P. ROBINSON
Werner G. Smith Co.
"Core Oils"

November 23

Toledo
ARMY ORDNANCE NIGHT
Waldorf Hotel, Toledo
LT. COL. THEODORE EICKHOFF
Cleveland Ordnance District
"Ordnance and the Foundries"

✦ ✦

November 26

Ontario
Royal Connaught Hotel, Hamilton
ROUND TABLE MEETING
Gray Iron, Malleable, Non-Ferrous
"Furnace Operation"

✦ ✦

December Meetings

December 3

Chesapeake
Engineers' Club, Baltimore, Md.
ROUND TABLE MEETING

✦ ✦

December 6

Chicago
Chicago Bar Assn., Chicago
"Inspection of Castings Through Non-Destructive Methods"

✦

Metropolitan
SPECIAL MEETING

✦

December 7

Michiana
La Salle Hotel, South Bend, Ind.
L. F. TUCKER
City Pattern Works
"Pattern Relation to Foundry"

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